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Original Research

Factors Affecting Parental Intent to Vaccinate Against COVID-19 in the United States

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ABSTRACT

Introduction. The topic of childhood vaccinations has become increasingly contentious, sparking debate, and creating challenging decisions for parents. This study aimed to explore the factors influencing COVID-19 vaccination decisions for parents of unvaccinated children and identify the most common reasons for not vaccinating children against COVID-19 in the U.S.

Methods. Authors analyzed data from Phase 3.7, Week 53 of the United States Census Bureau's Household Pulse Survey (N = 68,504), collected from January 4 to January 16, 2023. Standard descriptive statistics and adjusted odds ratio (aOR) were used to analyze the data.

Results. The top three reasons for vaccine hesitancy were concerns about side effects, lack of trust in the vaccine, and the perception that children in the household were not part of a high-risk group. Among respondents, nearly 87% (n = 59,363) reported receiving a COVID-19 vaccination, and these individuals were more inclined to vaccinate their children across all age groups studied. Additionally, participants with higher levels of education (bachelor's degree or higher) were more likely to vaccinate their children against COVID-19 (aOR = 5.79; 95% CI, 5.43-6.17; p <0.001).

Conclusions. Findings from the study suggest that some parents are still concerned about the COVID-19 vaccine and are hesitant to vaccinate their children against the disease. Information and insights from this study allow for a greater understanding of how parents are making this decision nearly three years after the pandemic officially began. Further studies are needed to determine how other factors, such as geographical location, also may affect parental COVID-19 vaccination hesitancy. ***Kans J Med 2024;17:51-56***

INTRODUCTION

In recent decades, childhood vaccinations have increasingly become a source of debate, controversy, and challenging decisions for parents.[1] The vaccine against the novel coronavirus infectious disease (COVID-19) is certainly no exception.[1,2] Considering the overwhelming amount of information and misinformation being generated and immediately available at the fingertips of most Americans each day,[2-3] it is important to understand what factors contribute to the decision parents in the U.S. make for vaccinating children against COVID-19.

The United States Food and Drug Administration (FDA) approved the Pfizer-BioNTech COVID-19 vaccine for those as young as 16 years old under an emergency use authorization on December 11, 2020.[4] Authorization was gradually expanded to include the Moderna COVID-19 vaccine, younger age groups, and eventually children as young as six months old in June 2022.[5] Despite this, many under the age of 18 years remain unvaccinated in the U.S. Currently, it is estimated that 15 million children between the ages of six months to four years, 17.5 million between 5 and 11 years, and 8.3 million between 12 and 17 years remain unvaccinated against COVID-19.[6] Unfortunately, COVID-19 infection in children and adolescents poses several risks, including long-term effects, such as trouble sleeping, concentrating, and fatigue.[7] Another complication associated with COVID-19 in children is multisystem inflammatory syndrome (MIS-C), which although rare potentially can be deadly.[8] Knowing the risks associated with COVID-19 infection in those under 18 years of age, it is important to obtain a clear understanding as to why so many remain unvaccinated.

According to the Kaiser Family Foundation (KFF) Vaccine Monitor poll in October 2021, which surveyed a nationally representative sample of adults in the U.S., 76% of parents of children ages 5 to 11 years reported being concerned about "not enough [being] known about the long-term effects of the COVID-19 vaccine in children."[9] Concerns about side effects and their children's future fertility also were reported.[9] According to the July 2022 KFF Vaccine Monitor poll, 81% of parents of unvaccinated children ages six months to four years also were concerned about serious side effects and a lack of knowledge existing about "long-term effects of the COVID-19 vaccine in children."[10] Despite these parental concerns, clinical trials have demonstrated that serious adverse events are rare.[11] Most adverse events in preauthorization trials were reported as being mild to moderate in severity and zero severe adverse events were reported for the Pfizer-BioNTech COVID-19 vaccine in children six months to four years and for the Moderna COVID-19 vaccine in children six months to five years.[11] Furthermore, while infection with COVID-19 could transiently affect fertility in males, fertility is not impaired in males or females after COVID-19 vaccination.[12]

Given that COVID-19 vaccines for those as young as 16 years old have been approved for over two years, along with now being approved for children as young as six months old, this study sought to determine what factors influence the COVID-19 vaccination plans for parents of unvaccinated children, as well as to identify which reasons for not vaccinating children against COVID-19 are the most common.

METHODS

In this study, the authors utilized data from Phase 3.7, Week 53 of the United States Census Bureau's Household Pulse Survey (HPS; N = 68,504), collected from January 4 to January 16, 2023.[13] The HPS began in April 2020 to provide insight into how the COVID-19 pandemic has affected households in the U.S. Data were originally collected in one-week periods but transitioned into two-week collection periods beginning in Phase 2 (August 2020). Data releases after this

transition are referred to as "Weeks" to ensure there is consistency with earlier phases.[14] The Census Bureau's Master Address File (MAF) was used as the source for Housing Units (HUs) sampled in the survey.[14] The bureau then used systematic sample approach to select 66 defined sample areas from the identified HUs that were interviewed once. Each HU was contacted by both email and text message if available[14] using Qualtrics, an online data collection platform. For Week 53, 1,049,855 HUs were identified, and surveys were received from 68,504 respondents in those HUs.[13] The Institutional Review Board (IRB) reviewed the data, confirming its public availability and de-identification. Consequently, our analyses did not involve human subjects and did not require IRB oversight.

Patient and Public Involvement. Patients/the public were not involved in the design or conduct of this research.

Statistical Analyses. For statistical analysis purposes, the respondents' intention to vaccinate was clustered into three groups (will vaccinate the children [combination of definitely and possibly get the children a vaccine], will not vaccinate the children [combination of definitely not and probably not get the children a vaccine], and unsure [combination of unsure about getting the children a vaccine and I do not know the plans for vaccination of the children]). Standard descriptive statistics were used to create a demographic profile and describe participant intentions to vaccinate.

Generalized linear mixed models were used to calculate associations between participant COVID-19 vaccination status, as well as those who received a positive COVID-19 test or were diagnosed with COVID-19 modeled as a binary outcomes (yes/no) against a single fixed effect for independent variables (likelihood of getting children vaccinated [under 5 years old, 5 to 11 years old, 12 to 17 years old], biological sex at birth, age, marital status, and highest level of education). Adjusted odds ratios (aOR) were estimated by modeling all significant independent variables against participant COVID-19 vaccination status, controlling for participant biological sex, age, race, ethnicity, marital status, highest level of education, income level, and type of insurance coverage. A sample size of 100 was calculated as necessary for adequate power (>0.85) to detect significant relationships among the variables with one degree of freedom, $p < 0.05$, and 0.5 effect size.[15]

RESULTS

Respondent Characteristics. Table 1 represents the demographic information of respondents (N = 68,504). The average age of respondents was 52 years old (standard deviation (SD), 15.8); 57.6% were biological female; 56.2% identified as female; and 88.1% were heterosexual. Most respondents (56.8%) reported being married; 90.9% were not from Hispanic, Latino, or Spanish origin; 82.0% were Caucasian or White alone; 53.8% completed a bachelor's or higher degree; 47.3% reported their household gross income as $75,000 or higher; and 47.2% had health insurance coverage through a current or former employer or union.

Table 1. Respondent's demographic information.

Characteristics	Measure (N = 68,504)
Age	
Mean (SD), y	52 (15.8)
Median	52
Minimum	18
Maximum	88
Marital status, no. (%)	
Never married	13,804 (20.2)
Married	38,937 (56.8)
Divorced	10,403 (15.2)
Separated	1,237 (1.8)
Widowed	3,674 (5.4)
Prefer to not answer	449 (0.7)
Biological sex, no. (%)	
Male	29,052 (42.4)
Female	39,452 (57.6)
Gender identity	
Male	28,343 (41.4)
Female	38,485 (56.2)
Transgender	261 (0.4)
None of these	639 (0.9)
Prefer to not answer	776 (1.1)
Sexual orientation	
Straight/heterosexual	60,376 (88.1)
Gay or lesbian	2,350 (3.4)
Bisexual	2,882 (4.2)
Something else	1,092 (1.6)
Prefer to not answer	964 (1.4)
I don't know	840 (1.2)
Ethnicity, no. (%)	
Hispanic, Latino, or Spanish origin	6,223 (9.1)
Not of Hispanic, Latino, or Spanish origin	62,281 (90.9)
Race, no. (%)	
Caucasian/White alone	56,158 (82.0)
African American/Black alone	5,522 (8.1)
Asian alone	3,375 (4.9)
Any other race alone, or race in combination	3,449 (5.0)
Highest degree/level of school completed, no. (%)	
Less than high school	453 (0.7)
Some high school	1,015 (1.5)
High school graduate or equivalent (for example GED)	8,476 (12.4)
Some college, but degree not received or is in progress associate's degree (for example AA, AS)	14,579 (21.3)
Associate's degree (for example AA, AS)	7,145 (10.4)
Bachelor's degree (for example BA, BS, AB)	19,356 (28.3)
Graduate degree (for example master's, professional, doctorate)	17,480 (25.5)

Table 1. Respondent's demographic information. *continued.*

Characteristics	Measure (N = 68,504)
Household gross income, no. (%)	
Less than $25,000	5,565 (8.1)
$25,000-$34,999	4,563 (6.7)
$35,000-$49,999	5,890 (8.6)
$50,000-$74,999	9,313 (13.6)
$75,000-$99,999	7,950 (11.6)
$100,000-$149,999	10,180 (14.9)
$150,000-$199,999	5,670 (8.3)
$200,000 and above	7,034 (10.3)
Prefer to not answer	1,497 (2.2)
Missing	10,842 (15.8)
Health insurance coverage, no. (%)	*n = 84,600**
Insurance through a current or former employer or union (self or through family member)	39,928 (47.2)
Purchased directly from insurance company (self or through family member)	12,537 (14.8)
Medicare, for people 65 and older, or with certain disabilities	16,335 (19.3)
Medicaid, Medical Assistance, or any kind of government-assistance plan for low income/disability	7,458 (8.8)
TRICARE or other military health care	2,709 (3.2)
VA (including those who have ever used/enrolled for VA health care)	3,090 (3.7)
Indian Health Service	480 (0.6)
Other	2,063 (2.4)

*Raw numbers are more than the sample size because some participants reported multiple insurance coverage.

COVID-19 Vaccine Hesitancy. As Table 2 shows, slightly over 43.4% (n = 29,712) of respondents reported having children under 18 years of age living in their household. As shown in Table 2, some respondents reported that they will not vaccinate children living in their household against COVID-19. Over 67% (n = 20,087) of the respondents with children in their household reported several reasons for not vaccinating their children against COVID-19 (Table 2). The top three reported reasons were: concerns about side effects of the COVID-19 vaccines on the children (22.9%), not trusting the COVID-19 vaccines as safe for the children (14.5%), and children in the household not being members of a high-risk group (14.2%; Table 2).

Nearly 87% (n = 35,857) of respondents reported receiving a COVID-19 vaccination. Table 3 illustrates the results of mixed model analyses, showing a significant positive association between respondents' COVID-19 vaccination status and their likelihood of vaccinating their children under 18 years old. Respondents who had received the COVID-19 vaccine were more likely to vaccinate their children: under 5 years old (aOR = 29.362; 95% CI, 19.98-43.90; p <0.001); aged 5 to 11 years old (aOR = 15.53; 95% CI, 10.45-23.07; p <0.001); and aged 12 to 17 years old (aOR = 10.14; 95% CI, 6.59-15.59; p <0.001). Additionally, participants with higher levels of education (bachelor's degree or higher) were more likely to vaccinate their children against COVID-19 compared to those with lower levels of education (aOR = 5.79; 95% CI, 5.43-6.17; p <0.001).

Table 2. Respondent's information regarding COVID-19 and COVID-19 vaccines.

Characteristics	Measure (N = 68,504)
COVID-19 vaccination status, no. (%)	
Received the vaccine	59,363 (86.7)
Not received the vaccine	8,458 (12.3)
Prefer to not answer	683 (1.0)
Tested positive or told by a physician or a health care provider that you have COVID?, no. (%)	
Yes	35,857 (52.3)
No	31,422 (45.9)
Prefer to not answer	739 (1.1)
Missing	486 (0.7)
Children living in household	*n = 29,712*
Children under 5 in household	7,845 (26.4)
Children 5 through 11 years old in household	11,061 (37.2)
Children 12 through 17 in household	10,806 (36.4)
Likelihood of getting children vaccinated (under 5 years old), no. (%)	*n = 5,438*
Definitely get the children a vaccine	599 (11.0)
Probably get the children a vaccine	542 (10.0)
Be unsure about getting the children a vaccine	716 (13.2)
Probably NOT get the children a vaccine	905 (16.6)
Definitely NOT get the children a vaccine	1,951 (35.9)
I do not know the plans for vaccination of the children under 5 in my household	670 (12.3)
Prefer to not answer	55 (1.0)
Likelihood of getting children vaccinated (5 to 11 years old), no. (%)	*n = 5,138*
Definitely get the children a vaccine	164 (3.2)
Probably get the children a vaccine	260 (5.1)
Be unsure about getting the children a vaccine	598 (11.6)
Probably NOT get the children a vaccine	947 (18.4)
Definitely NOT get the children a vaccine	2,532 (49.3)
I do not know the plans for vaccination of the children 5 to 11 in my household	545 (10.6)
Prefer to not answer	92 (1.8)
Likelihood of getting children vaccinated (12 to 17 years old), no. (%)	*n = 3,375*
Definitely get the children a vaccine	70 (2.1)
Probably get the children a vaccine	103 (3.1)
Unsure about getting the children a vaccine	258 (7.6)
Probably NOT get the children a vaccine	521 (15.4)
Definitely NOT get the children a vaccine	1,920 (56.9)
I do not know the plans for vaccination of the children 12 to 17 in my household	388 (11.6)
Prefer to not answer	115 (3.4)
Reasons for not getting children vaccinated, no. (%)	*n = 20,087*
Concern about side effect of the COVID-19 vaccine for children	4,609 (22.9)
Plan to wait to see if it is safe/may get later	2,140 (10.7)

Table 2. Respondent's information regarding COVID-19 and COVID-19 vaccines. *continued.*

Characteristics	Measure (N = 68,504)
Reasons for not getting children vaccinated, no. (%)	*n = 20,087*
Not sure if COVID-19 vaccine will work for children	636 (3.2)
Don't believe children need COVID-19 vaccine	2,466 (12.3)
Children in household are not members of a high-risk group	2,844 (14.2)
Children's doctor has not recommended COVID-19 vaccine	1,243 (6.2)
Parents/guardians in household do not vaccinate their children	352 (1.8)
Don't trust COVID-19 vaccines	2,915 (14.5)
Don't trust the government	1,967 (9.8)
Other reason	915 (4.6)

Nearly 87% (n = 35,857) of respondents reported receiving a COVID-19 vaccination. Table 3 illustrates the results of mixed model analyses, showing a significant positive association between respondents' COVID-19 vaccination status and their likelihood of vaccinating their children under 18 years old. Respondents who had received the COVID-19 vaccine were more likely to vaccinate their children: under 5 years old (aOR = 29.362; 95% CI, 19.98-43.90; p <0.001); aged 5 to 11 years old (aOR = 15.53; 95% CI, 10.45-23.07; p <0.001); and aged 12 to 17 years old (aOR = 10.14; 95% CI, 6.59-15.59; p <0.001). Additionally, participants with higher levels of education (bachelor's degree or higher) were more likely to vaccinate their children against COVID-19 compared to those with lower levels of education (aOR = 5.79; 95% CI, 5.43-6.17; p <0.001).

Table 3. Odds ratios for independent variables and whether participant had received COVID-19 Vaccine (N = 68,504).

Variables	Odd ratio (95% CI)	p Value
Sex		
Female vs male	0.90 (0.86 to 0.95)	<0.001
Age (for each additional year older)	1.03 (1.02 to 1.04)	<0.001
Race		
Caucasian/White alone	1.41 (1.28 to 1.55)	<0.001
African American/Black alone	1.39 (1.23 to 1.56)	<0.001
Asian alone	6.21 (5.02 to 7.68)	<0.001
Any other race alone, or race in combination	Reference	-
Marital status		
Married	1.26 (1.19 to 1.34)	<0.001
Widowed	1.33 (1.19 to 1.49)	<0.001
Divorced	0.99 (0.92 to 1.07)	0.805
Separated	0.63 (0.54 to 0.73)	<0.001
Never married	Reference	-
Highest degree/level of school completed		
Less than high school	Reference	-
Some high school	0.95 (0.74 to 1.22)	0.689
High school graduate or equivalent (for example GED)	1.19 (0.95 to 1.46)	0.128
Some college, but degree not received or is in progress Associate's degree (for example AA, AS)	1.74 (1.41 to 2.15)	<0.001
Associate's degree (for example AA, AS)	2.01 (1.62 to 2.50)	<0.001
Bachelor's degree (for example BA, BS, AB)	4.50 (3.65 to 5.57)	<0.001
Graduate degree (for example master's, professional, doctorate)	9.17 (7.35 to 11.42)	<0.001
Likelihood of getting children vaccinated (under 5 years old)		
Vaccinate the children	32.18 (21.81 to 47.47)	<0.001
Unsure	4.07 (3.46 to 4.78)	<0.001
Not vaccinate the children	Reference	-
Likelihood of getting children vaccinated (5 to 11 years old)		
Vaccinate the children	12.89 (8.74 to 19.02)	<0.001
Unsure	3.08 (2.64 to 3.59)	<0.001
Not vaccinate the children	Reference	
Likelihood of getting children vaccinated (12 to 17 years old)		
Vaccinate the children	7.77 (5.11 to 11.80)	<0.001
Unsure	2.23 (1.86 to 2.66)	<0.001
Not vaccinate the children	Reference	-

Note: CI = Confidence interval

Just over 52% (n = 35,857) of respondents reported either testing positive for COVID-19 or being diagnosed with the virus (Table 2). However, having had a COVID-19 diagnosis did not significantly impact their likelihood of vaccinating their children under 18 years of age (Table 4).

Table 4. Odds ratios for independent variables and whether participant had been diagnosed for COVID-19 (N = 68,504).

Variables	Odd ratio (95% CI)	p Value
Sex		
Female vs male	1.11 (1.08 to 1.15)	<0.001
Age (for each additional year older)	0.98 (0.97 to 0.99)	<0.001
Race		
Caucasian/White alone	0.94 (0.87 to 0.99)	<0.05
African American/Black alone	0.66 (0.61 to 0.72)	<0.001
Asian alone	0.82 (0.74 to 0.89)	<0.001
Any other race alone, or race in combination	Reference	-
Marital status		
Married	1.14 (1.09 to 1.18)	<0.001
Widowed	0.53 (0.49 to 0.57)	<0.001
Divorced	0.76 (0.72 to 0.79)	<0.001
Separated	0.95 (0.84 to 1.07)	0.379
Never married	Reference	-
Highest degree/level of school completed		
Less than high school	Reference	-
Some high school	1.09 (0.87 to 1.37)	0.439
High school graduate or equivalent (for example GED)	1.29 (1.06 to 1.56)	0.011
Some college, but degree not received or is in progress associate's degree (for example AA, AS)	1.53 (1.26 to 1.86)	<0.001
Associate's degree (for example AA, AS)	1.57 (1.29 to 1.91)	<0.001
Bachelor's degree (for example BA, BS, AB)	1.82 (1.51 to 2.21)	<0.001

Table 4. Odds ratios for independent variables and whether participant had been diagnosed for COVID-19 (N = 68,504). *continued.*

Variables	Odd ratio (95% CI)	p Value
Highest degree/level of school completed		
Graduate degree (for example master's, professional, doctorate)	1.74 (1.4 to 2.11)	<0.001
Likelihood of getting children vaccinated (under 5 years old)		
Vaccinate the children	0.95 (0.82 to 1.10)	0.507
Unsure	0.97 (0.85 to 1.11)	0.640
Not vaccinate the children	Reference	-
Likelihood of getting children vaccinated (5 to 11 years old)		
Vaccinate the children	1.01 (0.82 to 1.25)	0.898
Unsure	0.99 (0.87 to 1.15)	0.954
Not vaccinate the children	Reference	
Likelihood of getting children vaccinated (12 to 17 years old)		
Vaccinate the children	0.88 (0.64 to 1.21)	0.432
Unsure	0.92 (0.77 to 1.11)	0.391
Not vaccinate the children	Reference	-

Note: CI = Confidence interval

DISCUSSION

This study aimed to investigate the likelihood of parents vaccinating their children against COVID-19. The findings of this study provided valuable insights into the parental intention towards vaccinating children and lay the foundation to improve child vaccination rates. The results indicated a significant influence of parental COVID-19 vaccination status on the likelihood of vaccinating their own children. Parents who received the COVID-19 vaccine displayed a stronger intention to vaccinate their children when compared to parents who had not received the vaccine. These findings are supported by a study done by Nguyen et al.,[16] which analyzed HPS data collected from September 14 to November 14, 2022, and found that parents who had received the COVID-19 vaccine were more likely to have their children vaccinated against COVID-19. This association may be attributed to the firsthand experience of vaccinated parents with the safety and efficacy of COVID-19 vaccines, fostering increased confidence in vaccinating their children.

Survey participants were asked to select their reasons for having concerns about vaccinating their children against COVID-19. Many of these answers were rooted in a lack of knowledge or fear of adverse effects, which indicated a need to prioritize the provision of accurate and accessible information to improve pediatric vaccination rates, with a focus on the parents who exhibit higher levels of hesitancy. These findings also are supported by the study done by Nguyen et al.,[16] which found that the main reasons for COVID-19 vaccine hesitancy in parents included side effect concerns. These findings underscore the importance of addressing vaccine hesitancy among parents to ensure optimal vaccination rates in the pediatric population.

Furthermore, subgroups analyzed based on age, biological sex, marital status, and level of education revealed that lower education levels among all parents were associated with a lower likelihood of vaccinating their children. The study done by Nguyen et al.,[16] also found primary COVID-19 vaccine series completion to be higher for children and adolescents living in households with parents with education levels higher than a college degree. The similarities in the findings from this study and the study done by Nguyen et al.[16] suggest that parents' reasons for COVID-19 vaccine hesitancy and the impact of certain factors such as parental COVID-19 vaccination status and education level have remained constant since the fall of 2022. This suggests potential long-term socioeconomic disparities in vaccine decision-making, highlighting the need for targeted interventions and education programs to effectively reach and support parents with lower educational attainment and lack of resources. These findings also are similar to a study by Bertoncello et al.,[17] which showed that the rate of vaccine refusal is associated with a lower formal education level.

Limitations. There are several limitations to this study that should be noted. First, data collection relied on surveys and self-reporting, which could introduce recall biases. Future studies might consider using more objective measures, such as vaccination status from medical records or immunization registries, where possible. Second, the data used for analyses were collected only during Week 53 over a 12-day period, providing just a snapshot in time. Parents' perceptions of COVID-19 vaccines may have evolved due to additional safety and efficacy data and increased education. Additionally, while the sampling method aimed to collect representative data, using data from only Week 53 may limit the study's generalizability to the broader U.S. population. Furthermore, the cross-sectional design of this study does not capture changes in parental intent to vaccinate their children against COVID-19 over time. Given that COVID-19 vaccines for younger age groups had been available for only a few months at the time of data collection, parental intent may have changed as more information about these vaccines in children became available. Follow-up studies that assess parental decision-making regarding COVID-19 vaccination in children longitudinally may provide additional valuable insights.

CONCLUSIONS

The COVID-19 pandemic has emphasized the importance of childhood vaccines, sparking discussions and concerns among parents nationwide. Understanding the factors influencing parents' decisions regarding vaccinating their children against COVID-19 is crucial for public health. The study's findings reveal that some parents remain hesitant about the COVID-19 vaccine for their children, citing various reasons. This study provides valuable insights into parental decision-making nearly three years into the pandemic. By examining how parental COVID-19 vaccination status, demographics, and previous parental COVID-19 diagnoses affect children's vaccination rates, targeted strategies can be developed to increase vaccine uptake. Future research should explore how geographical factors also may influence parental COVID-19 vaccination hesitancy.

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