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COVID-19 Pediatric Vaccination Attitudes Among Parents in Ohio

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Introduction: This study aimed to examine factors associated with parental intention to vaccinate children against COVID-19 in Ohio following pediatric vaccine approval in October 2021.

Method: Online anonymous surveys were distributed between November 2021 and January 2022 to parents in Ohio.

Results: Surveys were completed by 581 parents of whom 43.5% reported they intended to vaccinate their children against COVID-19, whereas 56.5% did not intend to vaccinate their children. Perceiving a lack of support by health care providers was significantly associated with not intending to vaccinate children against COVID-19 (p < .001).

Discussion: Survey results from parents in Ohio indicate that perceived health care provider support and parents’ attitudes about pediatric COVID-19 vaccination influenced their intent to vaccinate their children. Hence, health care providers working with families need to focus on educating parents regarding the importance and safety of vaccination. J Pediatr Health Care. (2022) 36, e1–e6

KEY WORDS
COVID-19 vaccine, vaccination rate, pediatric vaccine, COVID-19, health care providers

INTRODUCTION
Vaccination is a critical primary preventive measure in public health. Centers for Disease Control and Prevention Advisory Committee on Immunization Practices offers guidelines regarding the timing and administration of childhood immunizations (Kroger, Bahta, & Hunter, 2022). The Advisory Committee on Immunization Practices and American Academy of Pediatrics recommend the COVID-19 vaccine for children aged ≥ 5 years who do not have a known vaccine contraindication (Committee on Infectious Diseases, 2022). Despite these recommendations, recent trends suggest that childhood vaccine hesitancy has increased during the pandemic (He, Mack, Neely, Lewis, & Anand, 2022) as the topic of vaccines gains attention. By December 2021, Ohio children aged 5−11 years had a COVID-19 vaccine uptake rate of 16%, which is lower than the national rate of 20.2% (Kaiser Family Foundation, 2022; Wagner, 2021). The delay in or refusal of vaccination increases the risk of potentially life-threatening diseases in children and communities.

By November 2021, 67.0% of the total U.S. population received at least one dose of the COVID-19 vaccine (Centers for Disease Control and Prevention, 2022a). Comparatively, Ohio with an estimated population of 11,780,017, (United States Census Bureau, 2022) had a lower overall vaccination rate of 55.5% (at least one dose) or 6,543,647 (Ohio Department of Health, 2022). Although the first COVID-19 vaccine for children 12−15 years of age was approved by the Food and Drug Administration in May 2021 and for children 5−11 years in October 2021, parents’ hesitancy challenges pediatric vaccination efforts.

In a large national sample, 167,262 out of 1,068,410 pediatric patients (15.6%) tested positive for COVID-19, and
6.1% were hospitalized in the pre-Omicron period (Martin et al., 2022). Although serious symptomatic COVID-19 presentation among children is relatively uncommon, clinical sequelae and complications such as multisystem inflammatory syndrome in children and the threat to children with underlying medical conditions, cannot be discounted. Furthermore, peak rates of COVID-19 related hospitalization of children increased from 1.8 per 100,000 during the Delta variant period to 7.1 per 100,000 during the Omicron variant period (Marks et al., 2022).

The decision to accept or refuse vaccination is a complex process that can be influenced by multiple factors. A systematic review attributed influenza vaccine hesitancy to misperceptions regarding susceptibility and severity of disease, concerns about vaccine safety and adverse effects, misunderstanding of vaccine efficacy, and a lack of trust in health authorities (Schmid, Rauber, Betsch, Lidolt, & Denker, 2017). With the onset of the COVID-19 pandemic, additional vaccine concerns and misinformation have surfaced, leading to COVID-19 greater vaccine hesitancy (Rodrigues, Block, & Sood, 2022).

Among 2,769 caregivers in the United States, Canada, and Israel who were surveyed before and after COVID-19 vaccine approval, 61.1% intended to vaccinate their children against COVID-19 on availability. The proportion of caregivers willing to vaccinate their children declined from the preapproval period (63.6%) to the postapproval period (56.6%). Factors positively associated with intent to vaccinate children at both periods were children’s up-to-date immunization status and older age of caregivers (Goldman et al., 2021). Another study conducted before Food and Drug Administration approval of the vaccine for children found racial/ethnic disparities in vaccine hesitancy among U.S. parents (Fisher, Gray, & Scheck, 2021). In a survey of 2,074 parents in the United States, 49.4% reported intent to vaccinate their children against COVID-19; parental factors negatively associated with vaccination were lower income and lower education (Teasdale et al., 2021).

The purpose of this study was to identify factors associated with parental intention to vaccinate children against COVID-19 in Ohio during the early period of pediatric vaccine approval.

METHOD
An online anonymous survey was distributed in English through the secure Qualtrics survey program between November 2021 and January 2022 to parents and caregivers through social media platforms and community contacts in schools, health departments, and other health care organizations, including public and private pediatric clinics throughout Ohio. Adults who confirmed that they were parents of at least one school age child were invited to participate in the voluntary online survey. The Health Belief Model (HBM) was the theoretical framework used to identify factors influencing an individual’s likelihood to engage in a given health behavior to prevent a negative outcome (Rosenstock, 1974; Rosenstock, Strecher, & Becker, 1988). The survey was comprised demographic questions, 10 items from the Parents Attitudes about Childhood Vaccines (PACV) survey developed using the HBM (Opel et al., 2011), nine questions from the PACV survey that were adapted specifically to the pediatric COVID-19 vaccination, and an open-ended question. The HBM was applied to parents’ intent to vaccinate their children against COVID-19, with the model’s constructs: components of the PACV for perceived susceptibility (likelihood of experiencing the untoward outcome), perceived severity (seriousness of the consequences associated with the outcome), perceived benefits (potential advantages of engaging in the health behavior and in the ability to prevent the undesired outcome), and perceived barriers (obstacles to engaging in the health behavior such as vaccine hesitancy and lack of health care provider’s support), along with modifying variables (personal characteristics including sex, marital status, parity, race/ethnicity, education, insurance, employment, residence, vaccinated parent, infection status) and cues to action (factors that prompt an individual to engage in the health behavior as with the timing of the spike in the pandemic outbreak with the Omicron variant, defined as the variant being detected in every state by December 20, 2021; Centers for Disease Control and Prevention, 2022b).

The vaccination attitude questions used a Likert scale of one to five for level of agreement (strongly disagree, disagree, not sure, agree, strongly agree) and a total score was calculated following the PACV tool instructions. Cronbach’s alpha test of internal consistency was conducted to determine the internal reliability of the 10 attitude items regarding childhood vaccination in general and the adapted nine items specific to COVID-19 vaccination. Anonymous data were downloaded from the Qualtrics site and stored on the researchers’ password-protected computers. Participant characteristics were described using frequencies. For categorical variables, $\chi^2$ or Fisher exact tests were used to compare proportional differences between the groups regarding parental intent to vaccinate their child against COVID-19. For continuous variables, $t$ tests were used to examine mean differences between the groups. To examine median differences in the pediatric COVID-19 vaccination attitude questions, nonparametric Mann-Whitney U tests were conducted. Variance inflation factor tests were conducted to check for possible collinearity in the regression analysis. Variables that were statistically significant on a level of $p \leq .05$ in bivariate analyses were included in the logistic regression model to calculate odds ratios (OR) and 95% confidence intervals to determine factors associated with intent to vaccinate. Data analyses were conducted using SPSS (version 25, IBM Corp., Armonk, NY). Human subjects’ approval for the study was provided by the researcher’s Institutional Review Board.

RESULTS
Six hundred and eighty-five parents participated in the survey, hailing from 55 out of 88 counties around the state (62.5% state-wide representation), with participants from
rural and urban regions of the state. Among the parents, 581 (84.8\%) answered the primary question of their intent to vaccinate their children and the vaccination attitudes scales and were included in the analysis. In answer to the question of intent to vaccinate their children, 43.5\% \((n = 253)\) of parents reported that they intended to vaccinate their children against COVID-19, whereas the remaining 56.5\% \((n = 328)\) did not intend to vaccinate their children. Characteristics of the parents and their vaccination and infection status are described in Table 1. Specifically, 90.4\% perceived support from their health care providers for childhood vaccinations, but only 49.1\% perceived provider support for the pediatric COVID-19 vaccination. Perceiving a lack of support by health care providers was significantly associated with not intending to vaccinate children against COVID-19 \((p < .001)\).

The reliability of the 10-item general childhood vaccination portion was good with Cronbach’s \(\alpha = 0.899\), and for the specific nine-item COVID-19 pediatric vaccination portion, the reliability was good with Cronbach \(\alpha = 0.946\). There were significant differences in pediatric COVID-19 vaccine attitudes between parents who intended and parents who did not intend to vaccinate their children (Table 1). The overall median score regarding pediatric COVID-19 vaccine attitude was 9.0, with a significantly different overall median score for parents who intended to vaccinate (median = 14) and parents who did not intend to vaccinate their children (median = 0). Significant differences were found among parents regarding the median score of each of the pediatric COVID-19 vaccine attitude items (Table 2).

In the logistic regression model, the significant variables associated with intent to vaccinate children against COVID-19 were perceived health care provider support \((OR = 7.27; p = .002)\) and the pediatric COVID-19 vaccination attitudes total score \((OR = 0.33; p < .001; Table 3)\).

**DISCUSSION**

The current survey of parents in Ohio indicates that perceived health care provider support and parents’ attitudes about pediatric COVID-19 vaccination significantly

| Table 1. Characteristics of parent participants in Ohio according to intent to vaccinate their children against COVID-19 \((n = 581, \text{unless otherwise indicated})\) |
|---|
| Characteristics | Not vaccinate\(^a\) | Vaccinate\(^b\) | \(p\) Value |
| Age (years) \((n = 571)\) | 39.6 ± 7.7 | 41.8 ± 7.4 | .001 |
| Timing | | | .468 |
| Before December 20, 2021 | 20.4 (67) | 22.9 (58) | | |
| From December 20, 2021 | 79.6 (261) | 77.1 (195) | | |
| Sex | | | .330 |
| Male | 14.6 (48) | 11.9 (30) | | |
| Female | 85.4 (280) | 88.1 (223) | | |
| Marital status \((n = 576)\) | | | .526 |
| Married/partnered | 0.526 | 0.526 | | |
| Not married/partnered | 9.5 (294) | 11.2 (223) | | |
| Parity | | | < .001 |
| Primiparous | 25.3 (83) | 39.9 (101) | | |
| Multiparous | 75.7 (245) | 60.1 (152) | | |
| Ethnicity/race \((n = 575)\) | | | .134 |
| White | 96.0 (310) | 98.4 (248) | | |
| Other | 4.0 (13) | 1.6 (4) | | |
| Education \((n = 575)\) | | | .001 |
| Not college graduate | 44.9 (146) | 30.8 (77) | | |
| College graduate | 55.1 (179) | 69.2 (173) | | |
| Employer-based health insurance \((n = 578)\) | | | .010 |
| Employed in health care | 78.2 (255) | 86.5 (218) | | |
| Employed in health care | 32.3 (106) | 28.5 (72) | | |
| Residence \((n = 518)\) | | | .705 |
| Urban | 26.4 (73) | 24.9 (60) | | |
| Rural | 73.6 (204) | 75.1 (181) | | |
| COVID-19 vaccinated parent | | | < .001 |
| COVID-19 infection of parent | 37.1 (122) | 100.0 (253) | | |
| COVID-19 infection of child | 77.4 (254) | 39.1 (99) | | |
| COVID-19 infection of child | 74.4 (244) | 38.3 (97) | | |
| Feels vaccine hesitancy | 82.9 (272) | 4.0 (10) | | |
| Seeks advice from medical person | 82.6 (271) | 96.0 (243) | | |
| Seeks advice from nonmedical person | 59.1 (194) | 35.5 (90) | | |
| Perceives health care provider support | 21.3 (73) | 86.0 (215) | | |
| Childhood vaccination attitudes scale | 6.6 ± 5.4 | 0.9 ± 1.5 | | |
| COVID-19 vaccination attitudes scale | 13.2 ± 3.4 | 1.1 ± 1.8 | | |

Note. Presented values are mean ± SD or \(n\) (%).
\(^a\) Intent to not vaccinate: \(n = 328\) (56.5%). \(^b\) Intent to vaccinate: \(n = 253\) (43.5%).
influenced their intent to vaccinate their children. This outcome aligned with the National Vaccine Advisory Committee 2015 report. Parents' attitudes regarding vaccine safety, efficacy, and benefits, in addition to their overall beliefs about vaccine-preventable diseases, are notable influences on the decision to vaccinate (National Vaccine Advisory Committee 2015). As such, health care providers working with families should focus on educating parents on the importance and safety of vaccines. This can be accomplished by incorporating evidence-based strategies into their practice.

Motivational interviewing is a strategy that can be used by health care providers to decrease vaccine hesitancy (McGregor & Goldman, 2021). Motivational interviewing is a non-confrontational communication style that uses empathetic, guided questioning that facilitates discussion. This strategy decreases negative attitudes and perception of vaccine risk while increasing the patient-provider trust and communication.

Parents who are vaccine-hesitant do not feel childhood vaccination is a common practice (McGregor & Goldman, 2021). Presumptive or announcement-type language can create a perception that vaccination is normal practice, increasing the possibility of vaccine uptake (Jacobson, St Sauver, Griffin, MacLaughlin, & Finney Rutten, 2020). Presumptive language is different than the conversational or participatory language in that presumptive language uses strong statements of what the health care provider intends to do. In this type of communication, a health care provider may state “Your child is due for the COVID-19 vaccine today.”

Two other interventions that may be implemented into a health care provider's practice are a patient reminder and a recall system (Jacobson Vann, Jacobson, Coyne-Beasley, Asafu-Adjei, & Szilagyi, 2018) and an interdisciplinary visit plan. This plan offers vaccination education to a patient or a parent, by telephone before the patient's scheduled appointment date (Shafer, Kearns, Carney, & Sagar, 2021). This allows the patient to receive vaccine information before the appointment, increasing the chance of vaccine uptake during the appointment.

Our study found a significant difference in parents' attitudes regarding children's vaccination based on their vaccination status. The HBM was previously used to examine predictors of vaccine uptake, with a study suggesting a correlation between parents' vaccination status and their intent to vaccinate their children (Smith et al., 2011), further emphasizing the importance of offering parents evidence-based information by trusted health care providers. A recent study of vaccine intention for influenza and COVID-19 using the HBM found that adults in the United States were more likely to intend to vaccinate on the basis of their perception of the individual benefits and risks rather than perceived risk of the disease within the larger community (Mercadante & Law, 2021). Furthermore, the study found

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**TABLE 2. Differences in medians of pediatric COVID-19 vaccination attitudes between parents who report intent to vaccinate their children (n = 253) and those who do not intend to vaccinate their children (n = 328)**

| Statement of pediatric COVID-19 vaccination attitude | Not vaccinate | Vaccinate | p Value |
|-----------------------------------------------------|--------------|-----------|---------|
| Pediatric COVID-19 vaccine is safe for child        | 2            | 0         | <.001   |
| Pediatric COVID-19 vaccine is effective against infection | 2            | 0         | <.001   |
| Good idea to give the COVID-19 vaccine to child     | 2            | 0         | <.001   |
| Better for child to develop immunity by getting COVID-19 infection than getting the vaccine | 2            | 0         | <.001   |
| Hesitant about the pediatric COVID-19 vaccine for child | 2            | 0         | <.001   |
| COVID-19 vaccine can prevent severe illness         | 2            | 0         | <.001   |
| Child may develop serious side effects from COVID-19 vaccine | 2            | 0         | <.001   |
| Openly discuss concerns about the COVID-19 vaccine with health care provider | 0            | 0         | <.001   |
| Trust health care provider’s information about COVID-19 vaccine | 1            | 0         | <.001   |

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**TABLE 3. Factors associated with parents' intent to vaccinate their children against COVID-19 (n = 581)**

| Factor                                | Odds ratio | 95% confidence interval | p Value |
|---------------------------------------|------------|-------------------------|---------|
| Age                                   | 1.04       | 0.95–1.13               | .425    |
| Parity                                | 0.47       | 0.11–2.02               | .310    |
| College education                     | 0.33       | 0.06–1.78               | .198    |
| Private insurance                     | 0.95       | 0.11–8.10               | .946    |
| COVID-19 infection of parent          | 1.03       | 0.20–5.19               | .975    |
| COVID-19 infection of child           | 2.10       | 0.38–11.57              | .394    |
| Health care provider support          | 7.27       | 2.03–26.03              | .002**  |
| Seeks advice from medical person      | 2.64       | 0.41–17.05              | .307    |
| Seeks advice from nonmedical person   | 3.28       | 0.85–12.65              | .084    |
| Childhood vaccination attitudes scale  | 1.29       | 0.95–1.74               | .101    |
| COVID-19 vaccination attitudes scale   | 0.33       | 0.24–0.46               | <.001***|

*p < .01.
**p < .001.
***p < .001.
that participants in the 18–49 age group with a lower income and lack of a personal contact directly affected by COVID-19 were less likely to intend to vaccinate (Mercadante & Law, 2021). This is noteworthy given the age by which most adults are having children and making vaccine-related decisions on their behalf.

Although, according to the regression model, only two HBM components were significantly associated with the intent to vaccinate children, the circumstances of COVID-19 persistence may have affected the other components. For example, by the time of the survey, COVID-19 had been at pandemic levels for approximately 2 years. Despite millions of people being infected nationally, there were limited pediatric fatalities and apparent overall mitigation of serious infection by the time of the Omicron variant. This may have minimized the severity among children and preclusion of the cue to action specific to the Omicron variant spike. Similarly, modifying variables that were significant on the bivariate did not remain significant in the model.

Parents’ perception of their health care providers’ support was a significant factor in their intent to vaccinate children. This demonstrates the importance of trusted health care providers clearly and consistently following evidence-based practice guidelines in educating their families regarding the safety and efficacy of the vaccine in preventing severe COVID-19 infection. Despite the recommendation to vaccinate children against COVID-19, (Committee on Infectious Diseases, 2022), uptake rates among children aged five to 11 in Ohio of 16.0% were lower than national rates of 20.2% by December 12, 2021 (Kaiser Family Foundation, 2022; Wagner, 2021). The two-dose vaccine has been found to be safe and effective in reducing the risk of infection in youth (Frenck et al., 2021) and was found to be 91% effective against developing multisystem inflammatory syndrome in children in children (Zambrano et al., 2022).

Parental vaccine hesitancy, which was reported by 48.5% of parents in the current study, is a challenge that health care providers must address by ensuring there is continuity in vaccine-promoting messages at all levels of the clinical organization (Finney Rutten et al., 2021; Olusanya, Bednarczyk, Davis, & Shaban-Nejad, 2021). Evidence-based strategies to promote parental vaccine acceptance during the COVID-19 pandemic focus on emphasizing the importance of improved vaccine counseling practices among pediatric providers which adhere to the recommended immunization schedule while allowing parental questions and concerns to be fully addressed. In addition, employing vaccine recall and reminder systems, adhering to safety protocols and infection control practices within the office, and seeking creative ways to ensure vaccine access among all populations were highlighted (Olusanya et al., 2021).

LIMITATIONS

A limitation of this study was self-selection bias, as parents with strong opinions about the pediatric COVID-19 vaccine may have been more inclined to participate in the survey. In addition, the original PACV tool was developed on the basis of the HBM, although the model is specific to behavior rather than intention. Regardless, strong reliability was found with the original tool and the tool adapted to COVID-19 vaccination. Further research is recommended to determine the applicability of the adapted PACV tool to pediatric COVID-19 vaccination.

This study provides several implications for clinical practice. Adults who personally received the COVID-19 vaccine unequivocally reported their intent to vaccinate their children. This highlights the importance of adherence to evidence-based immunization guidelines by adult health care providers. Gaining vaccine confidence and acceptance from parents when making their personal vaccine-related decisions may lay the foundation for future vaccine approval for their child.

According to the survey, parents who did not perceive their pediatric provider supporting the COVID-19 vaccine were significantly less likely to report an intent to vaccinate their child. This demonstrates that providers must be clear and consistent in offering vaccine-promoting messages that align with the recommended immunization schedule. Parental vaccine acceptance may be diminished if those entrusted with the health care of their children do not actively endorse the vaccine.

The discrepancy between parents’ perception of provider support for routine childhood immunizations in contrast to the COVID-19 vaccine suggests a need for increased provider education regarding the COVID-19 vaccine in general, as well as health care provider training in vaccine counseling best practices. Equipping pediatric providers with the skills to address parental vaccine concerns and communicate a strong recommendation for COVID-19 vaccination may demonstrate provider support for the vaccine. Consequently, this may lead to greater parental acceptance of the COVID-19 vaccine for children.

Conclusions

COVID-19 vaccines are an important public health measure to decrease the risk of morbidity and mortality. Beginning in November 2021, Ohio parents were surveyed to understand their perception of the COVID-19 vaccine and their intention to vaccinate their children against COVID-19. Study findings revealed that perceived health care provider support of the vaccine significantly influenced parents’ decision to vaccinate their children, highlighting the important role that health care providers play in pediatric vaccination. Health care providers should educate parents about the COVID-19 vaccine to promote vaccination uptake and dispel fears about the vaccine.

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