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COVID-19 vaccine hesitancy among low-income, racially and ethnically diverse US parents

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ABSTRACT

Objective: Examine factors impacting U.S. parents’ intention to vaccinate their children against COVID-19.

Methods: Data were collected February-May 2021 from parents living in six geographically diverse locations. The COVID-19 Exposure and Family Impact Survey assessed perceived susceptibility and severity to adverse outcomes from the pandemic. Semi-structured interviews assessed perceptions about benefits and risks of vaccinating children.

Results: Fifty parents of 106 children (newborn-17 years) were included; half were Spanish-speaking and half English-speaking. 62% were hesitant about vaccinating their children against COVID-19. Efficacy and safety were the main themes that emerged: some parents perceived them as benefits while others perceived them as risks to vaccination. Parent hesitancy often relied on social media, and was influenced by narrative accounts of vaccination experiences. Many cited the lower risk of negative outcomes from COVID-19 among children, when compared with adults. Some also cited inaccurate and constantly changing information about COVID-19 vaccines.

Conclusion: Main drivers of parent hesitancy regarding child COVID-19 vaccination include perceived safety and efficacy of the vaccines and lower severity of illness in children.

Practice Implications: Many vaccine-hesitant parents may be open to vaccination in the future and welcome additional discussion and data.

1. Introduction

Despite the efficacy and safety of several COVID-19 vaccines currently approved by the Federal Drug Administration’s (FDA) Emergency Use Authorization, many people voice ongoing hesitancy to vaccination, which has contributed to low vaccine uptake [1]. As new data emerge about the safety and efficacy of COVID-19 vaccination for children, developing strategies to support vaccine uptake is a critical public health priority. Advancing approaches to support informed parental decision-making around COVID-19 vaccination is also an opportunity to support health equity. The COVID-19 pandemic has already disproportionately burdened Black, Hispanic, and low-income Americans, who face higher COVID-19 morbidity and mortality and greater adverse socioeconomic consequences [2–5]. Thus, building strategies to specifically reach parents of children from these communities has the potential to reduce health disparities in the rates and complications from COVID-19.

In April 2021, prior to the approval of the COVID-19 vaccine for...
children younger than 16 years, just 30% of US parents reported intentions to vaccinate their 12-to-15-year-old children [6]. Mothers were more hesitant than fathers, and younger mothers identified as most hesitant [7]. Parents with higher income and more education had higher intention to vaccinate [7]. Despite being at higher risk for COVID-19 related morbidity and mortality, a large US study revealed that parents identifying as Black, with less education, or with lower income had decreased odds of intending to vaccinate their children against COVID-19 [1,8]. Many adults are also hesitant to vaccinate themselves against COVID-19. Vaccine hesitancy is highest among women, younger ages, less educated, and Black adults [9]. Survey studies indicate that among Black adults, the most common reasons for hesitancy to receive the COVID-19 vaccine are concerns about future unknown side effects, safety, and lack of trust [1,9]. Specific reasons for hesitancy among lower educated and low-income adults are unknown. It is therefore critical to understand barriers and facilitators to COVID-19 vaccination among these subgroups, and to develop effective vaccination strategies. In the absence of deliberate action to ameliorate disparities, the differential uptake of vaccines among children will further exacerbate the pre-existing health inequalities the pandemic has brought into focus.

With at least half of US parents forecasting some hesitancy towards vaccinating their children against COVID-19 [6], we sought to use a mixed-methods approach to more deeply understand parental beliefs and perceptions about the COVID-19 vaccine among a sample of low-income, racially and ethnically diverse US parents. We aimed to use quantitative and qualitative methods to examine parent perceptions about susceptibility to and severity of COVID-19 infection and negative outcomes, and the benefits and risks of vaccination against COVID-19.

2. Methods

2.1. Study population

Potentially eligible participants included parents of newborn–17-year-old children who were already enrolled in Greenlight Plus, an ongoing randomized controlled trial for obesity prevention [10]. All parents in the Greenlight Plus study had a newborn-24 month old child; several of them had additional children. Parents enrolled in Greenlight Plus were contacted and invited to participate in this supplemental study that aimed to understand the impact of COVID-19 on participants. A $50 gift card was offered for participation in the supplemental study. Purposive sampling was conducted to ensure geographical representation across the six participating institutions and to include Spanish- and English-speaking participants. There were no additional inclusion or exclusion criteria for the current study which was nested within the larger trial. The study was approved by the Institutional Review Board (IRB) at Vanderbilt University Medical Center.

2.1.1. Greenlight plus trial study sample

The ongoing trial is being conducted at 1) Duke University (North Carolina); 2) New York University (New York); 3) The University of North Carolina at Chapel Hill (North Carolina); 4) The University of Miami (Florida); 5) Stanford University (California); and 6) Vanderbilt University Medical Center (Tennessee). To be eligible for the Greenlight Plus Trial, parent-child dyads met the following criteria: infant presented to clinic for the first newborn visit; parent/legal guardian was English- or Spanish-speaking; had no plans to leave the clinic within two years; owned a smartphone with access to data services; and completed baseline data collection. Infants were excluded with gestational age < 34 weeks, birth weight < 1500 g, weight < 3rd percentile, or any medical problem that may affect weight gain. Parents were excluded if they were < 18 years old, had serious mental or neurologic illness, or had poor visual acuity (corrected vision worse than 20/50).

2.2. Data collection

Data collection occurred between February 24 and May 6, 2021. For context, the states in which the participants were residents offered the COVID-19 vaccine to all individuals 16 years and older on the following 2021 dates: California, April 15; Florida, April 5; New York, April 6; North Carolina, April 7; and Tennessee, April 5. On May 10, 2021, COVID-19 vaccination became available for children 12-to-15-year-old for the first time, when emergency use authorization was granted to Pfizer for use in this age group.

Constructs from the Health Belief Model (HBM), which served as the conceptual framework for the study, were used to design data collection [11–13]. According to the HBM, individuals would be more likely to get vaccinated if they thought they were susceptible to the illness, thought the illness was a serious condition, believed vaccination would reduce their susceptibility to the illness or made the symptoms less severe, did not think the vaccination had excessive personal costs/risks and the benefits of vaccination outweighed those costs, and were confident in their ability to obtain a vaccination [13,14].

2.2.1. Demographic characteristics

Participants self-reported demographic information including age, sex, race, ethnicity, language, education, number and ages of children living in the household, household income, child insurance, and difficulties paying monthly bills.

2.2.2. COVID-19 exposure and family impact survey (CEFIS)

The CEFIS was used to describe the perceived susceptibility for and severity of adverse outcomes from both COVID-19 infection and changes imposed by the pandemic [15,16]. The CEFIS includes 25 items (yes/no) that measure the participant’s exposure/susceptibility to COVID-19 and related events, 10 items that use a 4-point Likert scale to measure the impact/susceptibility of COVID-19, and 2 items that use a 10-point Likert scale to measure the distress/severity of COVID-19 (Appendix 1). Higher scores indicate more negative impact. Validation data support the use of the CEFIS for measuring psychosocial effects of the pandemic [16]. Normative data for the CEFIS from a sample of 1805 caregivers collected from May-September 2020 is available [16]. Surveys in Spanish and English were administered via telephone and stored in a secure REDCap database.

2.2.3. Qualitative interviews

HBM constructs related to vaccination were explored using a semi-structured interview guide (Appendix 1). We asked parents open-ended questions about their intention for vaccination for themselves and their children followed by prompts focused on perceived susceptibility to and severity of infection with COVID-19 as well as perceived benefits and risks to vaccination.

Four trained interviewers completed a standard certification process. Interviews lasted an average of 34 min (range 21–63 min) and were conducted using a HIPAA-secure virtual platform. Interviews were audio-recorded and transcribed. Interviews conducted in Spanish were translated into English by bilingual staff before analysis.

2.3. Data analysis

Demographic characteristics were summarized. COVID-19 vaccine intention was abstracted from the interview transcripts and categorized as yes, no, or undecided for each parent subject and their child(ren). The sample was then dichotomized into parents who intended to vaccinate their child(ren) (i.e., confident) and parents who were undecided or did not intend to vaccinate their child(ren) (i.e., hesitant).

2.3.1. CEFIS scale

CEFIS scale scores and individual items were summarized using means and standard deviations for continuous variables and percentages
for categorical variables. CEFIS total scale scores and individual items were compared between the vaccine confident vs hesitant groups using unpaired t-tests for means and Fisher’s exact tests for rates. The Impact Scale is a bidirectional 4-point scale that offers a fifth non-scored option (not applicable) for each item. Per instructions from scale developers, the Impact Scale score was prorated by allowing the mean to be calculated for participants with up to 3 missing responses out of 10 items because some items were not relevant to all respondents. The mean was calculated at the individual level using a denominator equal to the number of items with data. Analyses were performed using Stata 15 software [17].

2.3.2. Qualitative interviews
Thematic analysis, guided by the HBM, was used to identify themes from the transcripts [18,19]. We used primarily deductive theory-driven data coding and analysis [18]. First, codes were identified a priori by the research team based on the HBM. The initial codebook was reviewed by the research team and modified based on feedback. Following the development of a refined codebook, all transcripts were coded independently by two coders. Differences in coding were examined and adjudicated until consensus was reached. Groupings of codes were organized into themes and subthemes. Themes and subthemes were compared and contrasted between the confident and hesitant groups. Illustrative quotes were selected to represent themes and subthemes. Data organization and retrieval was facilitated by using NVivo software [20].

3. Results
3.1. Demographic characteristics

Of 88 participants initially contacted, 50 agreed to participate. Mean parent age was 32 years, and on average they had 2 children in the newborn–17-year age range (Table 1). The majority (98%) of participants were women, and 64% were Hispanic, 16% White, 14% Black, and 6% Asian. Language preference was English among 50% and Spanish among 50%. The participants reported indicators of low socioeconomic status across a range of domains: 20% had not completed high school, 32% had an annual household income below $20,000, and 82% of the children were insured by Medicaid.

3.2. Vaccination intentions

More than half (58%) of participants had received or planned to receive the vaccine themselves, 16% did not plan to receive the vaccine, and 26% were undecided. Thirty-eight percent planned to vaccinate their child(ren) against COVID-19; 14% did not plan to vaccinate their child(ren), and 48% were undecided. A parent’s intentions to vaccinate themselves generally aligned with their intentions to vaccinate their child(ren) (Table 2). However, among the 28 parents who planned to receive the COVID-19 vaccine themselves, 10 (36%) were undecided about whether they would vaccinate their child(ren). Among the 8 parent who did not plan to receive the vaccine, 2 (25%) were undecided about vaccinating their child(ren).

3.3. Perceived susceptibility

Table 3 summarizes CEFIS Exposure Scale results. The mean score on the CEFIS Exposure (susceptibility) Scale was 11.7 events, which is higher than the mean of 8.7 events in the normative sample [16]. Almost half (45%) of participants reported a family exposure to COVID-19, 32% had a family member diagnosed with COVID-19, and 8% had a family member hospitalized with COVID-19. About one-third (34%) reported difficulty getting food and 79% experienced decreased family income. In comparing vaccine confident to vaccine hesitant parents, total number of events were similar (12.3 vs 11.3, p = .3) and no event was significantly different between the two groups. Similarly, the qualitative data showed that the majority of the sample (both confident and hesitant) identified a vulnerability for themselves and their children to COVID-19 infection based on the high prevalence in the community, knowing someone who had been diagnosed, and the ease with which the virus spreads. A small minority of subjects who were hesitant felt they were not susceptible to the virus because of the safety measures they felt they were not susceptible to the virus because of the safety measures they were following (Table 4).

3.4. Perceived severity

Table 5 summarizes CEFIS Impact Scale results. The mean CEFIS Impact (severity) Scale score was 2.2 (SD 0.6), which is lower than the mean of 2.68 in the normative sample [16]. The mean self-reported
identified their reason for hesitancy as the lower risk of COVID-19 among children (Table 4). Strong endorsement for vaccinating their children was expressed by a parent who personally experienced severe illness due to COVID-19. Several hesitant parents identified their reason for hesitancy as the lower risk of COVID-19 among children, when compared with adults.

Table 3

| Event | Total N (%) | Hesitant N (%) | Confident N (%) | p-value |
|-------|-------------|----------------|----------------|---------|
| Schools / child care centers closed | 45 (96%) | 27 (93%) | 18 (100%) | .5 |
| “Stay at home” order | 41 (87%) | 27 (93%) | 14 (78%) | .2 |
| Child/ren’s education was disrupted | 40 (85%) | 24 (83%) | 16 (89%) | .7 |
| Unable to visit or care for a family member | 31 (66%) | 21 (72%) | 10 (56%) | .3 |
| Family lived separately for health, safety or job | 31 (66%) | 17 (59%) | 14 (78%) | .2 |
| Someone moved into (or back into) home | 4 (9%) | 1 (3%) | 3 (17%) | .2 |
| Had to move out of our home | 7 (15%) | 4 (14%) | 3 (17%) | > 0.9 |
| Family member kept working outside the home | 30 (64%) | 19 (66%) | 11 (61%) | .8 |
| Family member is a healthcare provider/first responder | 17 (36%) | 12 (41%) | 5 (28%) | .5 |
| Difficulty getting food | 16 (34%) | 10 (35%) | 6 (33%) | > 0.9 |
| Difficulty getting medicine | 11 (23%) | 6 (21%) | 5 (28%) | .7 |
| Difficulty getting health care when we needed it | 16 (34%) | 10 (35%) | 6 (33%) | > 0.9 |
| Difficulty getting other essentials | 16 (34%) | 9 (31%) | 7 (39%) | .8 |
| Self-quarantined due to travel or possible exposure | 28 (60%) | 18 (62%) | 10 (56%) | .8 |
| Family income decreased | 37 (79%) | 20 (69%) | 17 (94%) | .07 |
| Family member had to cut back hours at work | 35 (75%) | 19 (66%) | 16 (90%) | .09 |
| Family member required to stop working | 32 (68%) | 19 (66%) | 13 (72%) | .8 |
| Family member lost their job permanently | 21 (45%) | 10 (35%) | 11 (61%) | .1 |
| Lost health insurance/ benefits | 7 (15%) | 3 (10%) | 4 (22%) | .4 |
| Missed an important family event or it was canceled | 37 (79%) | 23 (79%) | 14 (78%) | > 0.9 |
| Family member exposed to someone with COVID-19 | 24 (48%) | 15 (52%) | 9 (50%) | > 0.9 |
| Family member diagnosed with COVID-19 | 16 (32%) | 11 (38%) | 5 (28%) | .5 |
| Family member hospitalized for COVID-19 | 4 (8%) | 2 (7%) | 2 (11%) | .6 |
| Family member in Intensive Care Unit for COVID-19 | 2 (4%) | 0 (0%) | 2 (11%) | 1 |
| Family member died from COVID-19 | 2 (4%) | 1 (3%) | 1 (3%) | > 0.9 |

Table 4

| Theme | Illustrative quotes |
|-------|---------------------|
| Perceived Susceptibility to COVID-19 | I lived two experiences of people who have had small children and the children were infected with COVID, that really was a fear, it could be for me and my daughters. That was my fear more than anything. (Spanish, New York, Confident) And there was so much prevalence in the community that we just, and we had a new baby. And so, we just wanted to be super careful and were a little more afraid. (English, Tennessee, Confident) I wouldn’t get it. I wouldn’t get it at all. I feel like me staying in the house is safe. That’s how I feel. I don’t really do nothing unless I go to the store. When I go to the store, I have my mask on. I always have hand sanitizer on me. And I keep the baby wrapped up. I don’t chill outside. I don’t go to anybody houses. I just stay in my own house. (Spanish, New York, Hesitant) |
| Low susceptibility | I think the risk of the disease is so much lower in children, that the risk benefit analysis is different. A lot of kids are asymptomatic, a lot of kids have a little cold and that’s it. And it’s different when it’s your kid versus if it’s yourself. (English, North Carolina, Hesitant) |

Table 5

| Construct | Total Mean (SD) | Hesitant Mean (SD) | Confident Mean (SD) | p-value |
|-----------|----------------|--------------------|---------------------|--------|
| Parenting | 2.2 (1.0) | 2.1 (1.0) | 2.2 (1.0) | .9 |
| Ability to care for your child | 1.5 (0.7) | 1.5 (0.6) | 1.6 (0.8) | .5 |
| Ability to care for other children in your family | 2.1 (1.0) | 2.0 (0.9) | 2.2 (1.1) | .6 |
| Ability to care for older or disabled family | 2.1 (1.1) | 2.1 (2.0) | 2.0 (1.2) | .8 |
| Your physical wellbeing – exercise | 2.6 (1.1) | 2.7 (1.1) | 2.6 (1.1) | .8 |
| Your physical wellbeing – eating | 2.3 (1.0) | 2.3 (0.9) | 2.3 (1.1) | .9 |
| Your physical wellbeing – sleeping | 2.2 (1.0) | 2.2 (1.0) | 2.1 (0.9) | .6 |
| Your emotional wellbeing – anxiety | 2.7 (0.9) | 2.6 (1.0) | 3.0 (0.8) | .2 |
| Overall parent COVID-19 related distress | 6.2 (2.7) | 5.9 (2.8) | 6.7 (2.6) | .3 |
| Overall child COVID-19 related distress | 4.5 (3.6) | 4.1 (3.3) | 5.2 (3.9) | .3 |

Questions source: COVID-19 exposure and family impact survey, Impact Scale.
Three participants declined to respond to the survey.
For the last two items (parent and child distress), scores range from 1 to 10. For the remaining items, scores range from 1 to 4. Higher scores indicate more negative impact.
### Perceived benefits of child vaccination against COVID-19 (Table 6)

Parents endorsed four key benefits: (1) Efficacy: Many parents discussed that the vaccine was effective at protecting people from COVID-19 infection generally, as well as from severe infection and death. All parents who intended to vaccine their children cited high efficacy; several hesitant parents endorsed the vaccines’ efficacy but felt that safety was a more important factor. (2) Safety: Some vaccine confident parents specifically referenced their confidence in the vaccine development and Centers for Disease Control (CDC) and FDA approval processes and the safety of the COVID-19 vaccines. (3) Return to Normalcy: Many parents, both confident and hesitant, discussed the hope for a return to normalcy as an important benefit of vaccination, including the return to school and the ability to travel and visit with friends and family. (4) Protecting Loved Ones: Among those who intended to vaccinate their children, many expressed they felt the vaccine is key to ending the pandemic as well as protecting children from COVID-19. A few participants who were breastfeeding mothers discussed the value of the vaccine in helping them protect their infants.

### Perceived risks of vaccination against COVID-19 (Table 6)

Parents discussed three primary perceived risks of vaccination: (1) Efficacy: Some participants mentioned needing more data on vaccine efficacy, including more trials specially involving children. One common example of concern related to efficacy was the perception that if masks were still required, the vaccine must not be effective. Concerns about efficacy as a risk were brought up exclusively by parents who were undecided or did not plan to vaccine their child(ren). (2) Safety: Parents’ perceived risks of the COVID-19 vaccine included known and unknown side effects. Many parents who were hesitant described learning about side effects from individual stories on social media. Both parents who intended to vaccinate and those who did not or who were undecided discussed some hesitancy because of the speed with which the vaccine was developed and the inability to study long-term side effects. Many parents who were undecided endorsed a “wait and see” approach before vaccinating their children, indicating they wanted to see how others react, and what pediatricians advise about the vaccine for children. Several parents expressed concern about the safety of taking the vaccine while pregnant or breastfeeding and expressed concern and skepticism about how the CDC guidance on COVID-19 vaccines appeared to fluctuate. (3) Return to Normalcy: Several parents who were undecided referenced the return to normalcy that accompanied vaccination to be a risk rather than a benefit. These parents, not fully confident in the efficacy of the vaccine, worried about scaling back of public health measures such as masking and social distancing with ongoing vaccination efforts. Finally, a unique risk that was mentioned by multiple Spanish-speaking participants who intended to vaccinate their children was the possibility of legal ramifications surrounding their immigration status. They mentioned being confused and desiring more clarity around the process for people without legal documentation status.

### Discussion and conclusion

#### 4.1. Discussion

Using a mixed methods approach guided by the HBM, we identified reasons for COVID-19 vaccine confidence and hesitancy among a sample of parents across diverse sociodemographic backgrounds and geographies in the US. The analysis revealed potential actionable facilitators and barriers to advancing uptake of COVID-19 vaccination among children. During our data collection, which occurred when vaccination against COVID-19 was becoming available to all US adults (but not yet children), only 38% of parents planned to vaccinate their children and almost half (48%) were undecided. Although vaccine hesitancy is not a...
new phenomenon, this degree of hesitancy is high relative to other vaccines. Adherence to current AAP recommended pediatric immunizations varies by vaccine ranging from 49% for the HPV vaccine to 93% for the Poliovirus vaccine in 2017 [21]. During the 2017–2018 flu season, 63% of children 6 months-17 years received the flu vaccine [22].

The parents in this sample had a strong perceived susceptibility to COVID-19 infection and related life changes required to contain the pandemic based on a high CEFIS Exposure Scale score. In contrast, the CEFIS Impact Scale score suggests that the perceived severity to COVID-19 infection and pandemic required changes was lower than the normative values. Qualitative interviews revealed that those parents who had direct personal experience of severe illness or loss due to COVID-19 were more likely to recognize the severity of COVID-19 among children and endorse vaccination. Many parents who were hesitant considered disease severity in the equation, referencing that although children were susceptible, the disease burden was lower [23–25]. For context, around the time the data were collected in April 2021, there had been a total of 3,782,724 COVID-19 cases reported in children representing 13.8% of all cases and 302 deaths attributed to COVID-19 in children, representing 0.01% of all COVID-19 related deaths [26].

As multiple studies have previously identified, efficacy and safety were identified both as perceived benefits and perceived risks [27–30]. Many of the parents who were hesitant in our sample believed the vaccines were effective, but were weighing the lower severity of the COVID-19 infection in children and the possibility of safety concerns related to the vaccine. Parents referenced multiple factors influencing their decision making including current COVID-19 infection rates, ongoing safety data, and recommendations from their child’s pediatrician.

Many parents who were hesitant stated they were leaning toward vaccinating their children but reported wanting to observe how others reacted to the vaccine and to wait for more data to inform their decision. This implies that many parents who are hesitant intend to revisit the vaccine decision and would welcome additional conversations and data.

Two important points related to information emerged during the qualitative interviews. Several parents mentioned the changing recommendations related to COVID-19 generally, and the vaccine specifically, as problematic. On the one hand, many changing recommendations may be attributed to new and updated information, as ongoing research clarifies our understanding of COVID-19. On the other hand, some parents pointed out the recommendations related to vaccine safety in certain populations seemed to change abruptly, and absent of new studies or evidence. Parents’ confusion about changing or mixed messages underscores the importance of using precise language when advising parents, and acknowledging with families that scientific discovery can be a slow and not straightforward process, and that recommendations may change as new information is uncovered [31,32].

In addition to challenges with changing information, the qualitative interviews also revealed that misinformation continues to be problematic for vaccine decision-making [33,34]. In our sample, multiple hesitant parents discussed false or inaccurate safety concerns including the vaccine causing infertility, neurologic insults, and death. A few parents believed the vaccine would cause them to be infected with COVID-19 or was a government tracking device. In considering the HMB, perceived risks of vaccination are a critical component. When those perceived risks are not actual risks, understanding why misinformation has been able to take hold and how we can do better at disseminating factual information becomes a critical focus of maximizing vaccine uptake. The stress and uncertainty accompanying the COVID-19 pandemic has created perfect conditions for misinformation to thrive. Unfortunately, it is vicious cycle: misinformation leads to confusion and distress, and feeling anxious makes people more willing to believe misinformation [35]. There is a need to counter the COVID-19 vaccine misinformation, with clear, honest, and responsive information that is sensitively framed and non-judgmental [36].

Similar to other studies, we found that social media was a commonly reported source of misinformation. Indeed, parents who were hesitant and discussed efficacy and safety as risks relied heavily on narrative stories from social media and friends as a source of vaccine information. In contrast, parents who were confident and referenced efficacy and safety as benefits discussed public agencies (FDA, CDC) and physicians as important sources of information. These observations suggest two opportunities for promoting the COVID-19 vaccine for children: (1) medical and public health leaders should use social media to provide scientifically valid information and dispel vaccine myths, including through partnerships with social-media “influencers.” (2) Using narrative success stories by building a collection of real people’s stories about good vaccination experiences and disseminating them through social media is one mechanism to reach parents who are hesitant to vaccinate their children against COVID-19 [37–41].

Our study has limitations. First, because the parents were sampled from a larger study of parents and their newborn–2-year-old children, all participants were parents of young children which may limit generalizability. Because parents had few children > 12 years the study findings should be considered most relevant for vaccine hesitancy among parents of younger children. Our study also only focused on English and Spanish-speaking families further limiting generalizability. Finally, this is a sample of parents who were already enrolled in a clinic-based study—because this is a population that is already making a commitment to receiving healthcare for their children, our study may underestimate vaccine hesitancy. While our study provides some insight into COVID-19 vaccine intentions at this point in time, opinions will likely change as more is known about vaccine efficacy and safety, and as the infection rate fluctuates.

4.2. Conclusion

In summary, we found that parent hesitancy regarding child COVID-19 vaccination is dynamic, and rooted in perceptions about efficacy and safety including known and unknown risks, and appreciation of the lower disease severity among children. Both constantly changing information and an abundance of misinformation are influencing vaccine decision making. Wider and equitable uptake of COVID-19 vaccine among children of all racial and ethnic groups may require more creative approaches from practitioners of pediatric and public health to address these challenges.

4.3. Practice implications

These findings have important implications for clinical practice, public health messaging, and public policy. First, when discussing vaccination, medical providers should ask the parent what factors are influencing their decision and what if anything, worries them about vaccination. This will allow the provider to tailor the conversation to the individual needs of the family. Providers should also be prepared to revisit the discussion at a future visit. Most of the parents who were hesitant in our sample reported wanting to observe how others reacted to the vaccine and to wait for more data to inform their decision. This implies that many parents who are hesitant intend to revisit the vaccine decision and would welcome additional conversations and data.

Similar to other studies, our study highlighted the need to address the contribution of misinformation to vaccine hesitancy. Providers should strive to understand locally circulating misinformation and counter concerns with informed reassurance. Our results also suggest that individual vaccine success stories, with human faces of COVID-19-vaccinated families returning to playdates, social gatherings, sporting events, and school may help families in making vaccination decisions for their children as they weigh perceived risks and benefits as data and recommendations related to the COVID-19 pandemic are constantly evolving.
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Contributors’ statement
Drs. Schilling, Orr, and Sanders conceptualized the study, conducted the analyses, drafted the initial manuscript, and reviewed and revised the manuscript. Drs. Delamater, Flower, Heerman, Perrin, Rothman, and Yin conceptualized the study, designed the interview guide and selected existing quantitative instruments, coordinated and supervised data collection, and critically reviewed the manuscript for important intellectual content. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Declaration of competing interests
The authors have no competing or conflicts of interest relevant to this article to disclose.

Appendix A. Supporting information
Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pec.2022.03.023.