Journal of Pediatric Nursing 65 (2022) 10–15

Contents lists available at ScienceDirect

Journal of Pediatric Nursing

journal homepage: www.pediatricnursing.org

Parental vaccine hesitancy and concerns regarding the COVID-19 virus

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ARTICLE INFO

Article history:
Received 1 November 2021
Revised 11 February 2022
Accepted 23 March 2022

Keywords:
Parental vaccine hesitancy
Vaccine hesitancy
Childhood vaccination
COVID-19

ABSTRACT

Purpose: This study assessed parental vaccine hesitancy in a metropolitan area of the United States. The study aimed to determine what characteristics and contributing factors influenced parental vaccine hesitancy and concerns regarding COVID-19.
Design and methods: An online survey was used to recruit 93 parents to answer demographic and vaccine hesitancy information. Vaccine hesitancy was measured using the Parent Attitudes about Childhood Vaccines survey. The study was conducted between June 2020 and September 2020 during the COVID-19 pandemic.
Results: The rate of vaccine hesitancy was 15%. One hundred percent of vaccine hesitant parents were mothers, at least 30 years of age, married, and had completed at least some college. When characteristics of vaccine hesitant parents were compared to non-hesitant parents, the hesitant parents reported having more children, with 93% reporting two or more children compared to only 74% of non-hesitant parents ($p = 0.046$). Fifty percent of hesitant parents reported no concerns regarding COVID-19 compared to only 20% of non-hesitant parents ($p = 0.006$), and significantly less hesitant parents reported willingness to have their children receive a safe, effective COVID-19 vaccine if it were available compared to non-hesitant parents ($p < 0.001$).
Conclusions: Our findings indicate that older mothers with two or more children are more likely to be vaccine hesitant and this hesitancy extends to the current COVID-19 pandemic.
Practice implications: Healthcare providers can use the results of this study to identify parents at risk for vaccine hesitancy and initiate individualized education to promote on-time childhood vaccination.

Introduction

In the last decade, there has been an increase in the rate of parents refusing or delaying vaccines for their children. Worldwide, parental vaccine hesitancy varies between nations, with rates of approximately 7% in Italy (Facciola et al., 2019), 12% in Argentina (Gentile et al., 2021), 14% in Ireland (Whelan et al., 2021) and Turkey (Akbas Gunes, 2020), and 23% in Israel (Ashkenazi et al., 2020). In the United States, rates of 3.5% (Lieu et al., 2015), 6% (Kempe et al., 2020), and 8% (Cunningham et al., 2018) have been reported. Furthermore, in the United States 6% to more than 60% of pediatric providers report at least one refusal to vaccinate per month, with higher rates of hesitancy in rural and suburban parents compared to urban parents (Leib et al., 2011). Recently, a large internet-based survey in the United States found that approximately 40% of parents had concerns regarding childhood vaccine safety and only 70% were confident regarding vaccine efficacy (Kempe et al., 2020). In addition, a large national telephone survey of parents found that only 80% had accepted all vaccines as scheduled for their children, indicating that as many as 20% had some degree of hesitancy toward vaccinating (McCauley et al., 2012).

Low rates of vaccination have contributed to the resurgence of many vaccine preventable diseases. Between 2011 and 2015, the percentage of children receiving no vaccines by age 2 years increased from 0.9% to 1.3% (Hill et al., 2018). In 2016, more than 5% of all children entering kindergarten in the United States were not or only partially vaccinated for measles, mumps, and rubella (Seither et al., 2017). Furthermore, vaccination rates for children entering kindergarten in states that allow religious and philosophical vaccine exemptions are more than 2% below those states that do not allow exemptions (Shaw et al., 2018). Finally, in a systematic review of outbreaks of vaccine preventable diseases in the United States, Phadke et al. (2016) calculated that 1416 cases of measles were reported between 2000 and 2015, of which more than 55% of those infected had not received a vaccine.

One factor contributing directly to vaccine hesitancy is the advent of the internet, which allows information from a variety of sources, some

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https://doi.org/10.1016/j.pedn.2022.03.010
0882-5963/

of which are anti-vaccine, to be rapidly disseminated to large numbers of people (Donzelli et al., 2018; Getman et al., 2018; Kang et al., 2017). Within the vaccine-hesitant community, parents are more likely to trust information from like-minded web-based sources and are less likely to seek out vaccine-related information from reputable sites or even their healthcare providers (Getman et al., 2018). In a study assessing health-related knowledge and beliefs of first-time mothers and their intent to vaccinate, approximately 60% of those who self-identified as hesitant cited Google/internet search engines as their go-to information source in contrast to only about 32% of those who self-identified as accepting of traditional vaccine schedules (Weiner et al., 2015).

Vaccine hesitancy can be related to distrust in efficacy of the vaccine as well as a need for education regarding how vaccines work. Weiner et al. (2015) found that only 6% of expectant mothers were satisfied with their level of knowledge regarding childhood vaccines. Concerns regarding disease severity and vaccine efficacy are frequently reported by parents as factors that influence their vaccine hesitancy (Sun et al., 2018). For example, some parents choose to not vaccinate their children for influenza based on the belief that either their child is healthy and therefore at low-risk, or they know someone who was vaccinated and still came down with the flu (Paterson et al., 2018). Other parents worry that vaccines are not safe, have a general distrust of the medical community, or believe that vaccines are not necessary (Paterson et al., 2018).

Patient education can promote increased vaccination rates. In fact, one study found that up to 47% of parents who were initially opposed to a vaccine who continued dialogue with their pediatricians ultimately ended up vaccinating their child (Opel, Heritage, et al., 2013). When education is available and provided by knowledgeable clinicians, vaccination rates have been significantly increased (Coenen et al., 2017; Murray et al., 2021). However, providers tend to rely heavily on presenting statistics, facts, and science about the safety and efficacy of vaccines to patients as justification for vaccinating, which may not be sufficient without the context of personal experience. It can be difficult for parents to see vaccine preventable diseases such as measles, rubella, and polio as a real health threat and concern. Chapman and Coups (2006) evaluated the influence of worry, regret, and perceived risk related to the decision to take (or not to take) the influenza vaccine. Emotions (worry and regret) were far stronger indicators of whether or not someone would vaccinate than perceived individual risk of getting the flu. In addition, evidence indicates that psychological determinants such as emotional distress, high perceived vaccine-related risk, and low perceived risk of illness are strong predictors of vaccine uptake (Schmid et al., 2017).

The COVID-19 pandemic has raised even greater concerns regarding vaccine hesitancy and the need to understand characteristics contributing to parental hesitancy. Therefore, the primary purpose of this study was to assess parental vaccine hesitancy and identify parental characteristics and contributing factors that influence vaccine hesitancy. The secondary purpose was to assess concerns regarding COVID-19 virus in the context of parental vaccine hesitancy. A metropolitan area was chosen in order to control for the geographic differences identified by previous research (Leib et al., 2011).

Methods

Design and recruitment

This observational, cross-sectional study recruited participants to complete one-time measurement of demographic and vaccine hesitancy information between June 2020 and September 2020 during the global COVID-19 pandemic. Face-to-face recruitment was not feasible due to public health restrictions, so participants were recruited via the social media platforms Facebook and Twitter, and online neighborhood groups. The online survey was administered by Qualtrics (Qualtrics^{XM}, Provo, UT). A link was provided to the consent and 25-item survey. All responses were anonymous and participants could choose to skip any questions that they did not want to answer. The Institutional Review Board at the University of Colorado Colorado Springs approved the study as exempt. Consent was documented as the voluntary completion and submission of the survey.

Population

Eligible participants included parents of children less than 18 years of age residing in the Denver metropolitan area who spoke and read English. Parents who were less than 18 years of age at the time of the study were excluded.

Instrumentation

The survey included 25 items in four general categories: (1) demographic information (7 items), (2) COVID-19 concerns (2 items), (3) sources of vaccine information (1 item), and parental vaccine hesitancy (15 items). All items were close-ended with two or more response options.

Vaccine hesitancy was measured using the Parent Attitudes about Childhood Vaccines (PACV) survey. The PACV is a validated, self-administered survey that was developed to specifically identify factors that influence a parent's decision to accept, delay, or withhold childhood vaccines (Opel et al., 2011). The PACV takes about 5 min to complete. It includes 15 items in three domains: immunization behavior, beliefs about vaccine safety and efficacy, and general attitudes toward vaccination (Cunningham et al., 2018; Opel, Taylor, et al., 2013). Items are structured for three different response formats including yes/no/don't know, a 5-point Likert scale (strongly agree, agree, not sure, disagree, strongly disagree), and an 11-point response scale (0−10) (Opel, Taylor, et al., 2013). Numeric points are assigned to each response according to a scoring table and totaled upon completion to give a raw score with a range of 0–100. If any data are missing, the raw score can be converted using simple linear conversion on the scoring table provided. Higher scores indicate a higher degree of parental vaccine hesitancy, with a cutoff score of 50 used to define parents that are vaccine hesitant (Opel et al., 2011; Opel, Taylor, et al., 2013). Previously, internal consistency for the PACV has been reported to be high, with Cronbach's alpha of 0.91 (Napolitano et al., 2018). For the current study, Cronbach's alpha for the PACV was calculated as 0.94. Furthermore, sequential removal of individual items retained an alpha of 0.94–0.95, indicating that no single item influenced the overall value of the coefficient. Permission for use of the PACV was obtained from the tool developer.

COVID-19 concerns were assessed with two questions, *"How concerned are you about the COVID-19 virus?" and "If a safe, effective vaccine for the COVID-19 virus were available today, would you want your child/children to receive it?"* The first question was answered on a 5-point scale from "not concerned at all" to "very concerned." The second question was answered on a 3-point scale ("no," "don't know," "yes").

Sources of information were assessed with a single question, *"Which of the following sources of information has had the greatest influence on your decision to vaccinate or to delay/withhold vaccination for your child/children?"* This was followed by a list of five choices identified from the literature (family or friends, resources from social media, information from my child's healthcare provider, resources from a parent support group, other).

Sample size calculation

To provide at least a moderate correlation of $r = 0.3$ between self-reported vaccine hesitancy and parental demographic characteristics, with 80% power ($\beta = 0.20$) and $p < 0.05$ (two-sided $\alpha = 0.05$), an adequate sample size was calculated to be at least 85 participants (Hulley et al., 2013).

Statistical analysis

Data were analyzed using SPSS version 27 (IBM, USA) with significance determined by a value of $p < 0.05$. Data were reported as frequencies (%) or means ± standard deviations. Descriptive statistics and frequencies were used to characterize participants and variables of interest, including the rate of vaccine hesitancy. A Shapiro-Wilk test was used to assess normal distribution of the dependent variable of interest (PACV scores), and because the data were not normally distributed, between-group differences were analyzed using a non-parametric Mann-Whitney *U* test. Spearman rank correlation analysis was used to identify significant relationships between parental characteristics and vaccine hesitancy (parents grouped as non-hesitant and hesitant). Any significant correlations were interpreted as factors contributing to hesitancy.

Results

Characteristics of the sample

There were a total of 93 responses to the survey. For age, there was one missing response. Five surveys (5%) were incomplete for PACV responses (i.e. not all questions were answered), but all were retained for analysis and the adjusted sample sizes for individual questions were reported.

The demographic data from the total sample of 93 participants are presented in Table 1. The majority of parents were mothers (91%) and over the age of 30 (92%). Eighty-five percent were Caucasian (85%) and approximately half had a 4-year college degree (42%), and two children (46%).

Table 1
Frequency (%) of parental demographic characteristics according to hesitancy group.

Characteristic	All ($N = 93$)	Non-hesitant ($n = 79$)	Hesitant ($n = 14$)	*P*-value
Relationship				0.215
Mother of child(ren)	85 (91)	71 (90)	14 (100)	
Father of child(ren)	8 (9)	7 (10)	0 (0)	
Age				0.246
18–29 years	7 (8)	7 (9)	0 (0)	
>30 years	85 (92)	71 (90)	14 (0)	
Missing	1	1	0 (0)	
Marital Status				0.708
Single	5 (5)	5 (6)	0 (0)	
Married	80 (86)	66 (84)	14 (100)	
Divorced	2 (2)	2 (3)	0 (0)	
Living with partner	6 (6)	6 (7)	0 (0)	
Education Level				0.757
8th grade or less	0 (0)	0 (0)	0 (0)	
Some high school	0 (0)	0 (0)	0 (0)	
High school graduate/GED	1 (1)	1 (1)	0 (0)	
Some college or 2-year degree	25 (26)	20 (25)	5 (36)	
4-year college degree	39 (42)	36 (46)	3 (21)	
More than 4-year degree	28 (30)	22 (28)	6 (43)	
Income				0.629
$30,000 or less	0 (0)	0 (0)	0 (0)	
$30,001–$50,000	4 (4)	3 (4)	1 (7)	
$50,001–$75,000	12 (13)	10 (13)	2 (14)	
$75,001 or more	77 (83)	66 (83)	11 (79)	
Number of Children				**0.046**
1	22 (23)	21 (26)	1 (7)	
2	43 (46)	37 (47)	6 (43)	
3	20 (22)	15 (19)	5 (36)	
4 or more	8 (9)	6 (8)	2 (14)	
Ethnicity/Race*				1.00
Caucasian	79 (85)	68 (86)	11 (79)	
African American	2 (1)	2 (2)	0 (0)	
Hispanic	18 (19)	16 (20)	2 (14)	
Asian	2 (2)	2 (2)	0 (0)	
American Indian/Pacific Islander	4 (4)	3 (4)	1 (7)	

Data presented as N (%).
Non-hesitant = PACV score < 50; Hesitant = PACV score ≥ 50 (PACV = Parent Attitudes About Childhood Vaccines).
P-values meeting the predetermined level of significance are bolded.
* Numbers may add up to more than total number of participants due to participants claiming more than one ethnicity.

Parental vaccine hesitancy

Response frequencies for the 15 items in the PACV survey are presented in Table 2. The mean score on the PACV for all participants was 20.08 ± 28.0. The mean score for non-hesitant parents was 9.33 ± 10.5, whereas the mean score for hesitant parents was 80.7 ± 14.4 ($p < 0.001$). Not surprisingly, scores for all 15 items were significantly different ($p < 0.001$) between hesitant and non-hesitant parents. Fifteen percent ($n = 14$) of participants scored 50 or higher on the PACV, identifying them as being vaccine hesitant.

Differences between vaccine hesitant and non-hesitant parents

One hundred percent of vaccine hesitant parents were mothers, at least 30 years of age, married, and had completed at least some college (Table 1). When characteristics of vaccine hesitant parents were compared to non-hesitant parents, there were no statistically significant differences other than in the number of children. The hesitant parents reported having more children, with 93% reporting two or more children compared to only 74% of non-hesitant parents ($p = 0.046$).

When asked specifically about COVID-19, all parents responded to the question regarding their concern about the COVID-19 virus. Twenty-five percent ($n = 23$) indicated that they were not concerned at all or not too concerned, 74% ($n = 69$) indicated that they were somewhat or very concerned, and 1% ($n = 1$) were not sure. When compared by hesitancy groups, there was a statistically significant difference ($p = 0.006$). Among non-hesitant parents, 20% ($n = 16$) indicated no concern compared to 80% ($n = 63$) who were concerned. Among hesitant parents, 50% ($n = 7$) indicated no concern compared to 43% (n = 6) who were concerned, while 7% (n = 1) were not sure.

When asked if a safe, effective vaccine for COVID-19 were available, would they want their child(ren) to receive it, 24% ($n = 22$) did not respond. Among those who did, 58% ($n = 54$) responded yes, while 18% ($n = 17$) responded no. When compared by hesitancy groups, there was a statistically significant difference ($p < 0.001$). Among non-hesitant parents, 23% ($n = 18$) did not respond. Among those who did, 67% ($n = 53$) responded yes and 10% ($n = 8$) responded no. Among hesitant parents, 9% ($n = 4$) did not respond. Among those who did, 7% (n = 1) responded yes, while 64% ($n = 9$) responded no.

When asked which sources of information (family/friends, social media/internet, healthcare providers, parent support group, other) had the greatest influence on their decision to vaccinate, 3% ($n = 3$) did not respond. Among those that did, 65% ($n = 60$) indicated healthcare providers, 4% (n = 4) indicated family/friends, 4% (n = 4) indicated social media/internet, and 24% (n = 22) indicated other sources of information. No parents indicated that they used parent supports groups as a source of information. There were no statistically significant differences in sources of information based on vaccine hesitancy. However, 73% ($n = 58$) of non-hesitant parents reported obtaining information from their healthcare provider, compared to only 14% (n = 2) of hesitant parents.

Contributing factors to parental vaccine hesitancy

Correlation analysis revealed significant relationships between hesitancy groups for number of children in the family, concern regarding COVID-19, and vaccine willingness. There was a weak but positive correlation between vaccine hesitancy and a greater number of children ($r = 0.21$, $p = 0.045$). Vaccine hesitant parents reported having a

Table 2
Parent Attitudes about Childhood Vaccines response frequencies.

	All (N = 93)	Non-hesitant (n = 79)	Hesitant (n = 14)
Have you ever delayed having your child get a shot for reasons other than illness or allergy?			
• Yes	12 (13)	1 (1)	11 (79)
• No	81 (87)	78 (99)	3 (21)
• I don't know	0	0	0
Have you ever decided not to have your child get a shot for reasons other than illness or allergy?			
• Yes	14 (15)	2 (3)	12 (86)
• No	79 (85)	77 (98)	2 (14)
• I don't know	0	0	0
How sure are you that following the recommended shot schedule is a good idea for your child?	(*N* = 92)	(*n* = 78)	
• 0–5 (Not sure)	16 (17)	3 (4)	13 (93)
• 6–7 (Sure)	6 (7)	5 (6)	1 (7)
• 8–10 (Completely sure)	70 (75)	70 (89)	0
Children get more shots than are good for them.	(N = 92)	(n = 78)	
• Agree	12 (13)	1 (1)	11 (79)
• Not sure	13 (14)	10 (13)	3 (21)
• Disagree	67 (72)	67 (85)	0
I believe that many of the illnesses that shots prevent are severe.			
• Agree	83 (89)	75 (95)	8 (57)
• Not sure	1 (1)	1 (1)	0
• Disagree	9 (10)	3 (4)	6 (43)
It is better for my child to develop immunity by getting sick than to get a shot.	(N = 92)	(n = 78)	
• Agree	11 (12)	5 (6)	6 (43)
• Not sure	12 (13)	6 (8)	6 (43)
• Disagree	69 (74)	67 (85)	2 (14)
It is better for children to get fewer vaccines at the same time.	(N = 92)	(n = 78)	
• Agree	31 (33)	18 (23)	13 (93)
• Not sure	34 (37)	34 (43)	0
• Disagree	27 (29)	26 (33)	1 (7)
How concerned are you that your child might have a serious side effect from a shot?			
• Not concerned	63 (68)	63 (80)	0
• Not sure	2 (2)	1 (1)	1 (7)
• Concerned	28 (30)	15 (19)	13 (93)
How concerned are you that any one of the childhood shots might not be safe?			
• Not concerned	65 (70)	65 (82)	0
• Not sure	3 (3)	1 (1)	2 (14)
• Concerned	25 (27)	13 (16)	12 (86)
How concerned are you that a shot might not prevent the disease?			
• Not concerned	69 (74)	65 (82)	4 (29)
• Not sure	5 (5)	4 (5)	1 (7)
• Concerned	19 (20)	10 (13)	9 (64)
If you had another infant today, would you want him/her to get all the recommended shots?	(*N* = 88)	(*n* = 77)	(*n* = 11)
• Yes	79 (85)	77 (98)	2 (14)
• No	9 (10)	0	9 (64)
• I don't know	0	0	0
Overall, how hesitant about childhood shots would you consider yourself to be?	(N = 92)	(n = 78)	
• Not hesitant	75 (81)	74 (94)	1 (7)
• Not sure	4 (4)	3 (4)	1 (7)
• Hesitant	13 (14)	1 (1)	12 (86)
I trust the information I receive about shots.			
• Agree	73 (79)	73 (92)	0
• Not sure	7 (8)	5 (6)	2 (14)
• Disagree	13 (14)	1 (1)	12 (86)
I am able to openly discuss my concerns about shots with my child's doctor.	(N = 92)		(*n* = 13)
• Agree	84 (90)	78 (99)	6 (43)
• Not sure	0	0	0
• Disagree	8 (9)	1 (1)	7 (50)
All things considered, how much do you trust your child's doctor.			
• 0–5 (Do not trust)	8 (9)	1 (1)	7 (50)
• 6–7 (Trust)	7 (8)	2 (3)	5 (36)
• 8–10 (Completely trust)	78 (84)	76 (96)	2 (14)

Data presented as N (%).
Non-hesitant = PACV score < 50; Hesitant = PACV score ≥ 50 (PACV = Parent Attitudes About Childhood Vaccines).
All responses significantly different between Hesitant and Non-hesitant groups ($p < 0.001$).

greater number of children compared to non-hesitant parents. There was also a moderate negative correlation between vaccine hesitancy and concern regarding the severity of COVID-19 ($r = -0.30$, $p = 0.005$). Parents who reported higher vaccine hesitancy reported less concern regarding COVID-19. Finally, as PACV scores increased, indicating vaccine hesitancy, willingness to accept a COVID-19 vaccine for a child decreased. There was a strong, negative relationship between hesitancy and vaccine willingness ($r = -0.63$, $p < 0.001$).

Discussion

Among parents who responded to the online survey the rate of vaccine hesitancy was 15%, although based on previous research (Leib et al., 2011) we recognize that rates may be higher outside of the metropolitan area in more suburban and rural neighborhoods. Our findings are consistent with rates of 8–15% reported by previous researchers using the PACV survey for measurement in the United States (Cunningham

et al., 2018; Opel, Taylor, et al., 2013) and Ireland (Whelan et al., 2021), and slightly below a rate of 20% reported in the United States with a national telephone survey using an unvalidated single question (McCauley et al., 2012). Interestingly, it is also consistent with recently reported rates of 12–14% from developing nations such as Turkey (Akbas Gunes, 2020) and Argentina (Gentile et al., 2021).

Based on demographic information, it would appear that characteristics common to those who identify as hesitant include being female, over age 30, married, and having completed at least some college. However, it should be noted that these are also characteristics reported by non-hesitant parents. The only demographic that was found to be statistically significant between vaccine hesitant and non-hesitant parents was the number of children in the family. Those that identify as being vaccine hesitant are statistically likely to have more children, which is consistent with research on parental vaccine hesitancy in Turkey (Akbas Gunes, 2020), but inconsistent with research in Israel (Ashkenazi et al., 2020). By comparison, there were no statistically significant relationships found between age, marital status, education level, income, or ethnicity/race and vaccine hesitancy, indicating that these characteristics were not potentially contributing factors to vaccine hesitancy in this sample, although they have been previously identified by other researchers (Akbas Gunes, 2020; Ashkenazi et al., 2020; Facciola et al., 2019; Gentile et al., 2021; Opel et al., 2011; Whelan et al., 2021).

Based on responses to the PACV, the current study revealed that there may be other important factors that contribute to hesitancy. Most of the participants who identified as hesitant shared similar concerns about childhood vaccines. The vast majority of hesitant parents (93%) were unsure about following the recommended vaccine schedule and agreed that children should get fewer shots at one time. Also, 93% of hesitant parents stated that they were concerned that their child would develop a serious side effect from a shot and 86% were concerned that the shot would not prevent the illness. Finally, about half of hesitant parents (43%) agreed that it was better for their child to develop immunity to an illness by getting sick than by being vaccinated.

It is of particular concern that those who identified as hesitant also indicated that they lacked trust in the information they received about shots (86%) and only half (50%) felt that they could openly discuss their concerns about shots with their child(ren)'s healthcare provider. Strikingly, 50% of parents who were hesitant indicated that they do not trust their child's healthcare provider. All of these findings, are in agreement with a recent systematic review that identified factors contributing to parental vaccine hesitancy, including concerns regarding vaccine safety and effectiveness, as well as distrust of healthcare providers and pharmaceutical companies (Haroune & King, 2020). Furthermore, within the context of the information sources actually used to decide whether to vaccinate or not, our findings should be considered clinical warning signs.

Approximately 80% of vaccine hesitant parents reported using social media/internet or other sources of information to inform their decision regarding vaccinations for their children. Use of these alternate sources may well be based on distrust of healthcare providers, which is a commonly identified barrier to childhood vaccination in developed countries and a defining characteristic of hard to vaccinate populations (Ozawa et al., 2019). Given the urgency created by the COVID-19 pandemic and the strong relationship between general vaccine hesitancy and specific decisions regarding COVID-19 vaccination, the need to build trust between healthcare providers and parents is clear. Pediatric nurses who regularly interact with anxious parents can play an essential part in building this trusting relationship (Goldschmidt, 2021).

Practice implications

This study identified parental characteristics common among those who are hesitant and identified factors that contributed to hesitancy. Healthcare providers can use these findings to identify those who may be hesitant to accept vaccines for their children. In particular, healthcare providers should assess mothers over the age of 30 with two or more children for concerns and hesitancy regarding vaccines. Once identified, providers will be able to better counsel parents in hopes of increasing the rate of timely childhood vaccination.

Based on the relationship between emotions (worry and regret) and the decision to vaccinate previously reported (Chapman & Coups, 2006; Schmid et al., 2017), healthcare providers could also use individual items from the PACV survey to facilitate counseling. It seems likely that triggering emotional responses in parents by presenting vaccine preventable diseases as very real threats could increase the likelihood that they will choose to vaccinate their children. For example, child-specific items that reflect worry, such as the question regarding concern about serious side effects, could be used to facilitate a discussion regarding the safety of vaccines. Approaching parents in the context of their concerns regarding COVID-19 may provide an additional strategy for parental vaccine counseling. One notable finding of the current study was that despite hesitancy, more than 50% of vaccine hesitant parents believed generally that the illnesses that vaccines prevent are severe, and this belief tracked relatively well to specific concerns regarding COVID-19. A targeted discussion regarding COVID-19 may successfully open the door to a broader discussion of childhood vaccines in general. Furthermore, since vaccine hesitant parents are more likely to be amenable to information available on the internet and social media (Getman et al., 2018), healthcare providers should incorporate references to credible websites into parental counseling. Although more research regarding parental vaccine hesitancy is needed, the current study provides preliminary data suggesting a strong overlap between general vaccine hesitancy and hesitancy regarding the COVID-19 vaccine. The practice implications of this association cannot be ignored.

Limitations

Limitations of this study include that it was conducted in a single metropolitan area of the United States. Therefore, it would be difficult to generalize the findings to a larger and more diverse population. Also, the COVID-19 pandemic developed and reached its peak during the completion of this study, which necessitated the use of online data collection and may have limited our ability to gather a more diverse sample across the community. However, in the United States 86% of urban households have internet access and 93% are computer literate (Martin, 2021), so we do not believe this was a significant weakness in our design.

Conclusion

Vaccine hesitancy continues to be an issue encountered in many healthcare settings. In light of the COVID-19 pandemic, it has become an even larger threat to public health. The current study, which was conducted during the COVID-19 pandemic, highlights the importance of understanding the rate of parental vaccine hesitancy in our communities and identifying those who may seek to delay vaccines for their children. Healthcare providers should take the time to not only identify parents who might be hesitant, but also to identify the reason(s) behind their hesitance. In doing so, the healthcare community can work to build trusting partnerships and provide individualized education to parents in hopes of promoting on-time childhood vaccination.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Permissions

Permission to use the Parent Attitudes About Childhood Vaccines survey was obtained from its developer, Douglas J. Opel, MD, MPH.

Credit authorship contribution statement

Teresa L. Salazar: Conceptualization, Methodology, Software, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Deborah L. Pollard:** Conceptualization, Methodology, Writing – review & editing. **Deborah M. Pina-Thomas:** Conceptualization, Methodology, Writing – review & editing. **Melissa J. Benton:** Methodology, Formal analysis, Data curation, Writing – review & editing.

Declaration of Competing Interest

All authors declare that they have no competing interests.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pedn.2022.03.010.

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