

# Vaccine Delays, Refusals, and Patient Dismissals: A Survey of Pediatricians

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abstract

**BACKGROUND:** Parental noncompliance with the American Academy of Pediatrics and Centers for Disease Control and Prevention immunization schedule is an increasing public health concern. We examined the frequency of requests for vaccine delays and refusals and the impact on US pediatricians' behavior.

**METHODS:** Using national American Academy of Pediatrics Periodic Surveys from 2006 and 2013, we describe pediatrician perceptions of prevalence of (1) vaccine refusals and delays, (2) parental reasons for refusals and/or delays, and (3) physician dismissals. Questions about vaccine delays were asked only in 2013. We examined the frequency, reasons for, and management of both vaccine refusals and delays by using bivariate and multivariable analyses, which were controlled for practice characteristics, demographics, and survey year.

**RESULTS:** The proportion of pediatricians reporting parental vaccine refusals increased from 74.5% in 2006 to 87.0% in 2013 ( $P < .001$ ). Pediatricians perceive that parents are increasingly refusing vaccinations because parents believe they are unnecessary (63.4% in 2006 vs 73.1% in 2013;  $P = .002$ ). A total of 75.0% of pediatricians reported that parents delay vaccines because of concern about discomfort, and 72.5% indicated that they delay because of concern for immune system burden. In 2006, 6.1% of pediatricians reported "always" dismissing patients for continued vaccine refusal, and by 2013 that percentage increased to 11.7% ( $P = .004$ ).

**CONCLUSIONS:** Pediatricians reported increased vaccine refusal between 2006 and 2013. They perceive that vaccine-refusing parents increasingly believe that immunizations are unnecessary. Pediatricians continue to provide vaccine education but are also dismissing patients at higher rates.



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**DOI:** 10.1542/peds.2016-2127

Accepted for publication Jul 1, 2016

**WHAT'S KNOWN ON THIS SUBJECT:** Vaccine refusals and delays result in increased numbers of undervaccinated and unvaccinated children in the United States. The challenges that these refusals and delays are placing on pediatric practices appears to be increasing.

**WHAT THIS STUDY ADDS:** We found that almost all US pediatricians encounter vaccine delays and refusals. They perceive that vaccine refusals are increasing and that parental reasons are changing. In the past decade, pediatricians have become increasingly likely to dismiss patients for continued refusals.

**To cite:** Hough-Telford C, Kimberlin DW, Aban I, et al. Vaccine Delays, Refusals, and Patient Dismissals: A Survey of Pediatricians. *Pediatrics*. 2016;138(3):e20162127

Listed as one of the top public health achievements of the 20th century by the Centers for Disease Control and Prevention (CDC), vaccines have changed the face of childhood and adult disease in the United States.<sup>1,2</sup> Among US children born between 1994 and 2013, vaccinations will prevent ~322 million illnesses, ~21 million hospitalizations, and ~732 000 deaths in their lifetimes.<sup>3</sup> Domestic policies mandating childhood immunizations have led to high US immunization rates<sup>4,5</sup> and to the near elimination of most vaccine-preventable diseases.<sup>6,7</sup> In recent years, however, some of these illnesses have made a resurgence in the United States and globally.<sup>6,8-12</sup> Decreasing parental acceptance of the benefits and safety of vaccines has resulted in increasing rates of nonmedical vaccine exemptions and of children who are underimmunized and unimmunized.<sup>13-18</sup> Historical data suggest that the reasons for these refusals and delays (also called alternative vaccine schedules) may be changing over time.<sup>19,20</sup>

Recent behavioral literature has examined the complexity surrounding parental motivation and decision to delay or refuse vaccinations, loosely referred to as vaccine hesitancy.<sup>21-24</sup> With the regular frequency with which parents question vaccines<sup>25-29</sup> and the significant amount of time needed to counsel and educate parents on this topic (often at the expense of other anticipatory guidance<sup>27</sup>), American Academy of Pediatrics (AAP) policymakers and pediatric providers have a strong interest in understanding US pediatricians' experiences with vaccine refusals, delays, and provider responses to vaccine refusals.

The AAP has assessed the extent of vaccine hesitancy experienced by its members through its Periodic Surveys.<sup>30</sup> Using 2 Periodic Surveys that asked about vaccines, 1 from 2006 and the other from 2013, we

sought to examine pediatrician experiences with parental requests for vaccine delays and refusals. We also aimed to assess the extent to which vaccine refusal affects pediatricians' practice, both in the provision of education to parents and patient dismissal. We hypothesized that reasons for vaccine delay and refusal, as perceived by physicians, are similar; vaccine refusals have increased in 2013 compared with 2006; and pediatricians were more likely to dismiss patients in 2013 than in 2006.

## METHODS

### Periodic Surveys

Data were obtained from the AAP Periodic Survey of Fellows in 2013 (PS84) and 2006 (PS66).<sup>30</sup> Periodic Surveys are conducted 3 or 4 times per year by the AAP on various topics of importance to pediatricians. The sole topic of both PS66 and PS84 was immunizations (see Supplemental Information); we analyzed questions from the "Vaccine Safety" Section in PS66 and from the "Vaccine Refusal/Delay" Section in PS84 (see Supplemental Information). Both surveys used a unique, random sample of nonretired US members of the AAP. The surveys were pilot tested with a random sample of about 200 US AAP members. The content for both surveys was created by pediatrician advisors to the AAP and the CDC Childhood Immunization Support Program. Both surveys were approved by the AAP Institutional Review Board as exempt from human subjects review.

The 2006 Periodic Survey was mailed to 1620 AAP members, with 6 follow-up contacts made between July and November and a postcard reminder to nonrespondents between the second and third mailings. The 2013 Periodic Survey was mailed to 1622 AAP members, with 6 follow-up contacts made between October 2012 and March

2013. A \$2 bill and a flyer were included in the first mailing. After the second and fourth mailings, nonrespondents were contacted via e-mail offering the option to respond electronically.

In both 2006 and 2013, demographic information, practice characteristics, and information about vaccine refusals and patient dismissals were collected. Pediatricians were asked in both years whether they had encountered vaccine refusals within the past 12 months and asked to estimate the proportion of parents in their practice who refused 1, some, or all vaccines. Subsequent questions included impressions of parental reasons for the refusal, how frequently (always, sometimes, never) they provide vaccine education, how successful they thought the education was at achieving vaccination, the average length of time between initial refusal and permission to vaccinate, and the frequency with which the respondent dismissed patients (always, sometimes, never) for continued vaccine refusal. Questions about vaccine delays (frequency and impressions of parental reasons) only were included in the 2013 survey. Pediatricians were asked to provide estimates for the survey questions but did not perform chart reviews.

### Statistical Analysis

Analyses on both surveys were limited to pediatricians who provided patient care and age-appropriate immunizations as reflected in the AAP and CDC Advisory Committee on Immunization Practices immunization schedule ( $n = 629$  in 2006;  $n = 627$  in 2013). Pediatricians who do not routinely administer vaccines were excluded. We used  $\chi^2$  test and  $t$  tests to compare differences between the 2 survey years for categorical and continuous (in Table 1) variables, respectively. Multiple logistic regression models were fitted separately for each

survey year to investigate how US region and practice location were related to vaccine delays, refusal, and pediatrician dismissal of patients. In modeling dismissal outcome, we also included age and gender of the physician. If region or practice location was found to be significant in the model, we constructed 95% confidence intervals (CIs) for the odds ratios to perform pairwise comparisons. A priori we were interested in 3 pairwise comparisons for region (West as reference) and for practice location (urban, inner city as reference). For pediatrician impressions of parental reasons for vaccine delays in 2013, we constructed a 95% CI for the proportion of pediatricians selecting a particular reason for parental delays. For reasons for refusal, we compared the proportions in 2006 and 2013 by using a  $\chi^2$  test.

To determine significance of the variables in the models for delays and refusals, we used a Bonferroni method of determining significance (ie,  $P < .0083$  [ $0.05/6$ ]) to account for multiple testing due to fitting 3 different logistic models with 2 variables being tested in each model. Similarly, we used  $P < .0083$  to determine significance in comparing the proportions between 2006 and 2013 of pediatricians selecting the perceived reasons for refusal (total of 6 reasons provided in the survey). For all other testing, we used the cutoff of  $P < .05$ . All analyses were conducted in SAS version 9.3 (SAS Institute, Inc, Cary, NC).

## RESULTS

Of the 1620 AAP members who received surveys in 2006, 852 completed surveys were received (52.6% response). Of the 1622 members who received surveys in 2013, 854 total surveys were received (52.7% response). Pediatricians were excluded if they did not participate directly in patient care or did not

**TABLE 1** Characteristics of Eligible Respondents in 2006 and 2013

Physician Characteristics	2006	2013	<i>P</i> <sup>a</sup>
All respondents, <i>n</i>	852	854	
Completed surveys, <i>n</i>	852	818	
Excluded respondents, <i>n</i>	223	191	
Eligible respondents, <sup>b</sup> <i>n</i> (%)	629 (73.8)	627 (76.7)	.62
Age, y, mean (SD)	44.5 (11.4)	46.5 (11.9)	.003
Female gender, <i>n</i> (%)	359 (57.3)	387 (62.2)	.08
US region, <i>n</i> (%)			.49
Northeast	138 (21.9)	147 (23.4)	
Midwest	136 (21.6)	153 (24.4)	
South	220 (35.0)	202 (32.2)	
West	135 (21.5)	125 (19.9)	
Practice area, <i>n</i> (%)			.94
Urban, inner city	147 (24.0)	140 (23.0)	
Urban, non–inner city	141 (23.0)	136 (22.3)	
Suburban	249 (40.7)	255 (41.9)	
Rural	75 (12.3)	78 (12.8)	
Practice setting, <i>n</i> (%)			.02
Solo or 2-physician	112 (18.8)	80 (13.2)	
Group or staff health maintenance organization	305 (51.3)	316 (52.1)	
Hospital or clinic practice <sup>c</sup>	178 (29.9)	210 (34.7)	
Patient visits per week, %, mean (SD)	88.7 (62.1)	77.4 (69.8)	.003
Patients with public health insurance, %, mean (SD)	38.0 (32.2)	41.8 (30.0)	.006
Practice ownership (full or part), <i>n</i> (%)			
Yes	n/a	194 (31.3)	
No	n/a	425 (68.7)	

n/a, not applicable.

<sup>a</sup> *P* values compare 2006 and 2013 for each variable;  $P < .05$  is considered significant.

<sup>b</sup> Eligible respondents: pediatricians who provide patient care and offer age-appropriate immunizations.

<sup>c</sup> These included medical school–affiliated clinics, hospital clinics, and community health center clinics.

offer age-appropriate immunizations, resulting in 629 respondents in 2006 and 627 respondents in 2013 who were used in the analyses. Characteristics of respondents in each survey year are presented in Table 1.

### Vaccine Delays (Alternative Vaccine Schedules)

Questions about vaccine delays were asked in 2013 only; 87.6% of pediatricians reported experiencing parental requests to delay  $\geq 1$  vaccine in the preceding 12 months. Pediatricians estimated on average that 7.3% of all parents in their practice requested to delay 1 vaccine, 7.1% requested to delay some vaccines, and 4.3% requested to delay all vaccines, totaling 18.7% of all parents who requested to delay  $\geq 1$  vaccine. The results of the multiple logistic regressions demonstrated no statistically significant differences between regions of the United States ( $P = .06$ ) but found significant differences by

practice location ( $P < .001$ ) (Table 2), with urban, inner-city pediatricians being less likely than those in other locations to encounter requests for delays. Confidence intervals were wide among rural pediatricians because of the very high percentage (98.7%) of parental requests for vaccine delays. Therefore, a paucity of data exist from rural pediatricians who did not experience vaccine delays, which would provide more reliable estimates for comparison.

Pediatricians' perceptions of parental reasons for vaccine delays are summarized in Table 3. Their perceptions are that the most common reasons parents seek to delay vaccines are concern for their child's discomfort (75.0%; 95% CI, 71.3%–78.7%) and the fear that too many vaccines are a burden on their child's immune system (72.5%; 95% CI, 68.6%–76.3%).

## Vaccine Refusals

In 2006, 74.5% of pediatricians reported that they had experienced parental vaccine refusals in the previous 12 months; by 2013 this number had increased to 87.0% ( $P < .001$ , odds ratio [OR] 2.29; 95% CI, 1.69–3.10). Pediatricians estimated the percentage of parents in their practice who refused 1 vaccine (average of 4.5% in 2006 vs 8.6% in 2013,  $P < .001$ ), some vaccines (2.5% vs 4.8%,  $P < .001$ ), and all vaccines (2.1% vs 3.3%,  $P = .07$ ).

Figure 1 summarizes respondents' perceptions of parental reasons for vaccine refusal in both survey years. In 2013, the most commonly cited reason pediatricians believe parents refuse vaccines was because parents view them as unnecessary (73.1%). This represents a significant increase from 63.4% in 2006 ( $P = .002$ ). However, 3 of the 6 reasons for vaccine refusal significantly declined in frequency, as perceived by pediatricians, including the concern for autism and/or thimerosal (74.2% in 2006 vs 64.3% in 2013;  $P = .002$ ).

Table 4 demonstrates that both region and practice area were significant predictors for vaccine refusal; region was significant only in 2006, with western pediatricians being more likely than southern or midwestern pediatricians to experience vaccine refusals. By practice location, results were similar for both years: Urban, inner-city pediatricians were least likely to experience vaccine refusals compared with pediatricians practicing in other locations.

## Pediatrician Response

In 2006, 6.1% of pediatricians reported "always" dismissing patients for continued vaccine refusal, and by 2013 this number nearly doubled to 11.7% ( $P = .004$ ). Of the pediatricians who had dismissed patients, 79.9% in 2013 and 87.4% in 2006 listed that their

**TABLE 2** Vaccine Delays in 2013: Results of Logistic Regression

Variables	N	Count, n (%)	Odds Ratio (95% CI)	P <sup>a</sup>
All	599	525 (87.6)		
Region of the United States				.06
West	118	106 (89.8)	Reference	
Midwest	146	132 (90.4)	1.16 (0.48–2.77)	
South	193	163 (84.5)	0.52 (0.24–1.11)	
Northeast	142	124 (87.3)	1.18 (0.50–2.75)	
Practice area				<.001
Urban, inner city	133	90 (67.7)	Reference	
Urban, non–inner city	133	115 (86.5)	3.64 (1.89–7.00)	
Suburban	255	243 (95.3)	11.24 (5.54–22.80)	
Rural	78	77 (98.7)	43.00 (5.73–322.84)	

All variables included in the logistic model are listed in this table.

<sup>a</sup> P values <.0083 are considered significant.

**TABLE 3** Pediatrician Impressions of Parental Reasons for Vaccine Delays in 2013

Parental Reason	2013 Delays (n = 516), % <sup>a</sup>
Discomfort to the child of having too many shots at 1 time	75.0
Too many vaccines are a burden on the child's immune system	72.5
Safety or concerns about adverse side effects, other than autism or thimerosal	56.8
Concern about autism	53.9
Baby is too small	42.1
Believe immunizations are unnecessary	25.6
Concern about thimerosal	22.7
Philosophical opposition to immunizations	20.4
Mistrust of pharmaceutical industry, government advisory groups, or physician organizations	18.0
Too costly to pay for multiple vaccinations	5.8

Pediatricians were asked to select  $\geq 1$  reasons for delays. Of the 525 respondents who experienced vaccine delays (Table 2), 9 did not provide reasons for delays.

<sup>a</sup> This represents the percentage of pediatricians who experienced delays (out of 516) and selected this particular reason as their impression of the parental reason for the delay.

reason was lack of trust between physician and patient. Asked in 2013 only, 80.5% of pediatricians listed concern for other patients as a main reason for patient dismissal for continued vaccine refusal.

Results from multiple logistic regressions of pediatricians who reported "always" dismissing patients for continued vaccine refusals are presented in Table 5. Increasing age was associated with increasing likelihood of patient dismissal. In 2006, pediatricians who always dismiss were not significantly different with regard to gender, region of the United States, or practice area. By 2013, though, significant differences were found by US region ( $P = .03$ ) and practice location ( $P = .02$ ); pediatricians in the West were less likely to dismiss

patients compared with the Midwest (OR 3.51; 95% CI, 1.10–11.18) and South (OR 4.62; 95% CI, 1.52–14.06). Suburban pediatricians in 2013 were more likely than those in urban, inner-city locations to dismiss (OR 3.33; 95% CI, 1.11–9.96).

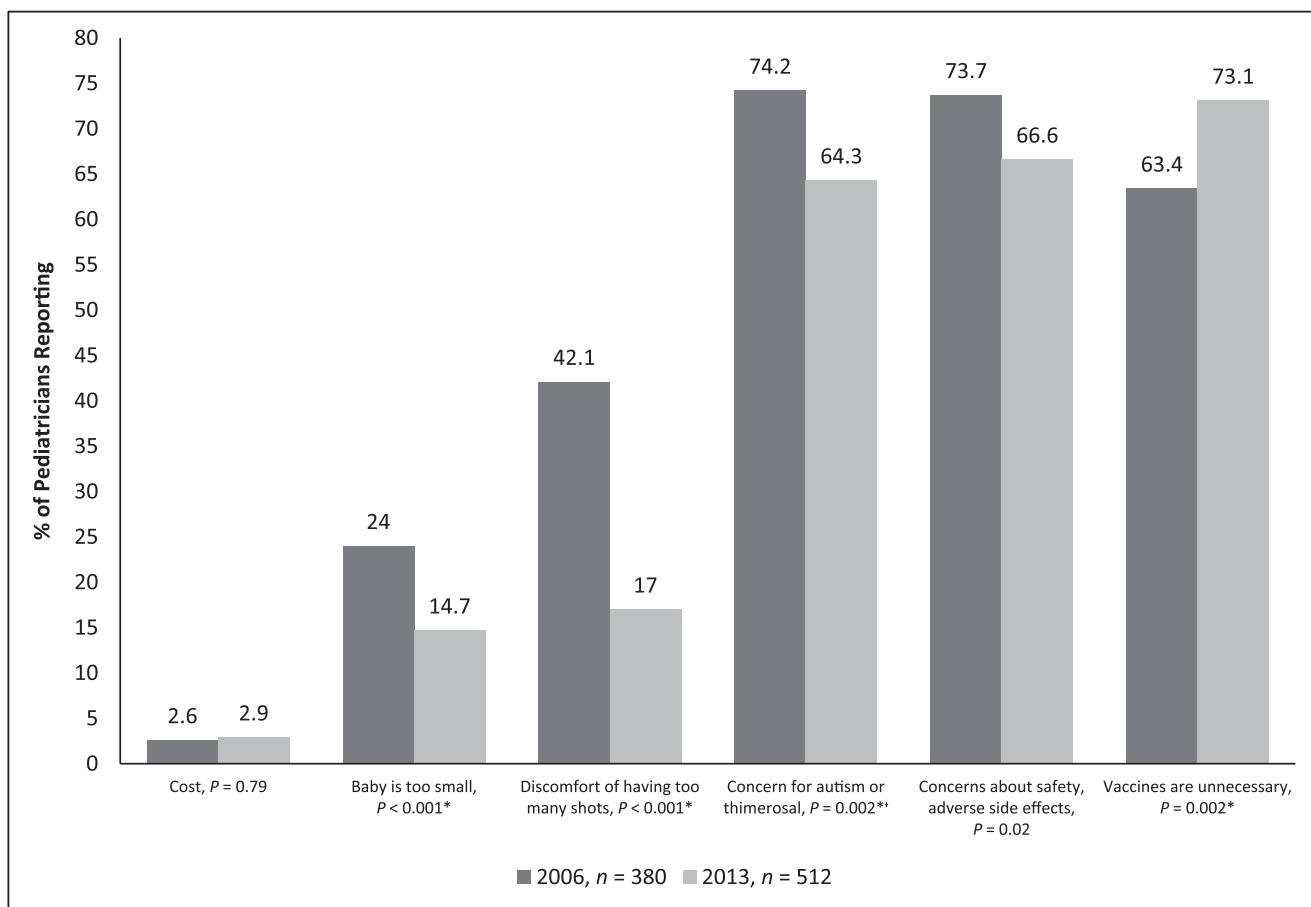
Most pediatricians in both survey years reported providing vaccine education to vaccine-refusing parents (95.8% in 2006, 94.0% in 2013;  $P = .20$ ). In 2006 and 2013, pediatricians reported that on average 31.9% (SD = 30.7%) and 34.4% (SD = 29.8%), respectively, of their patients who initially refused a vaccine changed their minds after educational efforts. In 2013, an average of 15.9 (SD = 23) weeks elapsed between initial refusal and permission for the vaccine according to the pediatricians' estimates. However,

**TABLE 4** Vaccine Refusals in 2006 and 2013: Results of Logistic Regression

Variables	2006 Refusals				2013 Refusals			
	<i>N</i>	Count, <i>n</i> (%)	Odds Ratio (95% CI)	<i>P</i> <sup>a</sup>	<i>N</i>	Count, <i>n</i> (%)	Odds Ratio (95% CI)	<i>P</i> <sup>a</sup>
All	593	442 (74.5%)			601	523 (87.0%)		
Region of the United States				.001				.04
West	124	106 (85.5%)	Reference		119	112 (94.1%)	Reference	
Midwest	131	96 (73.3%)	0.36 (0.19–0.71)		146	130 (89.0%)	0.51 (0.20–1.30)	
South	209	141 (67.5%)	0.30 (0.17–0.56)		194	163 (84.0%)	0.30 (0.13–0.72)	
Northeast	129	99 (76.7%)	0.61 (0.31–1.21)		142	118 (83.1%)	0.36 (0.15–0.91)	
Practice area				<.001				<.001
Urban, inner city	140	74 (52.9%)	Reference		134	100 (74.6%)	Reference	
Urban, non- inner city	136	103 (75.7%)	2.92 (1.70–4.99)		134	117 (87.3%)	2.16 (1.11–4.22)	
Suburban	244	207 (84.8%)	5.66 (3.43–9.34)		255	231 (90.6%)	3.27 (1.82–5.89)	
Rural	73	58 (79.5%)	4.21 (2.14–8.30)		78	75 (96.2%)	8.66 (2.54–29.53)	

All variables included in the logistic model are listed in this table.

<sup>a</sup> *P* values <.0083 are considered significant.



**FIGURE 1**

Change in pediatrician perceptions of parental reasons for vaccine refusals between 2006 and 2013. A total of 62 of the 442 respondents who experienced refusals in 2006 and 11 of the 523 in 2013 did not provide reasons for refusal. Reasons for refusal that were consistent between survey years are listed in the figure. \**P*s <.0083 are considered significant. + In 2013, questions were asked separately about parental concerns for thimerosal and autism; in 2006 these questions were combined.

9.2% of pediatricians reported that educational efforts did not convince any vaccine-refusing parents to

give permission. Pediatricians who reported patient dismissals in the preceding year estimated that they

had dismissed an average of 2.6 (SD = 11.6) patients during that time. Among parents who refused vaccines



**TABLE 5** Patient Dismissals for Continued Refusals in 2006 and 2013: Results of Logistic Regression

Variables	2006 Always Dismiss				2013 Always Dismiss			
	<i>N</i>	<i>n</i> or Mean	Odds Ratio (95% CI)	<i>P</i> <sup>a</sup>	<i>N</i>	<i>n</i> or Mean	Odds Ratio (95% CI)	<i>P</i> <sup>a</sup>
All, (%)	397	24 (6.1)			469	55 (11.7)		
Gender, (%)				.99				.16
Male	164	12 (7.3)	Reference		174	29 (16.7)	Reference	
Female	233	12 (5.2)	1.01 (0.40–2.55)		295	26 (8.8)	1.56 (0.84–2.90)	
Age, mean (SD)	397	49.2 (12.5)	1.05 (1.004–1.09)	.03	469	50.7 (11.7)	1.04 (1.01–1.06)	.01
Region of the United States, (%)				.27				.03
West	97	4 (4.1)	Reference		98	4 (4.1)	Reference	
Midwest	86	3 (3.5)	0.94 (0.19–4.61)		114	16 (14.0)	3.51 (1.10–11.18)	
South	123	10 (8.1)	2.32 (0.68–7.93)		148	26 (17.6)	4.62 (1.52–14.06)	
Northeast	91	7 (7.7)	2.66 (0.70–10.1)		109	9 (8.3)	2.01 (0.58–6.98)	
Practice area, (%)				.24				.02
Urban, inner city	64	1 (1.6)	Reference		87	4 (4.6)	Reference	
Urban, non–inner city	93	7 (7.5)	5.07 (0.58–44.24)		104	7 (6.7)	1.18 (0.32–4.39)	
Suburban	185	14 (7.6)	5.00 (0.63–39.74)		213	36 (16.9)	3.33 (1.11–9.96)	
Rural	55	2 (3.6)	1.65 (0.14–19.67)		65	8 (12.3)	1.80 (0.50–6.51)	

All variables included in the logistic model are listed in this table.

<sup>a</sup> *P* values <.05 are considered significant.

from birth, the mean age of the child at the time of dismissal was 11 (SD = 36.4) months.

## DISCUSSION

Pediatricians perceive that parents increasingly question the need to follow the AAP and CDC vaccine schedule. Nearly all pediatricians surveyed in 2013 encountered parents who refused and delayed vaccines, which is in line with previous literature.<sup>26,27,31–34</sup> Pediatricians reported that the percentage of parents who refuse some vaccines almost doubled between 2006 and 2013, and they described that almost 1 in 5 parents in their practice requested to delay ≥1 vaccines. Our findings highlight that in a busy practice, vaccine refusals and delays occur daily (if not multiple times per day). Pediatricians report that they continue to provide education to vaccine-refusing and delaying parents at high rates. Despite these continued efforts, the rate of pediatricians who always dismiss patients for continued vaccine refusal has nearly doubled across survey years.

Counter to our original hypothesis, we found that the most commonly cited reasons perceived by pediatricians for vaccine delays and refusals are actually different. Our study demonstrated that pediatricians perceive that parents delay vaccines most often because of concerns about harmful effects of the vaccines on the child, such as discomfort or burden to their young child's immune systems. However, to our knowledge this is the first study to demonstrate the perception among pediatricians of increasing rates of parents who believe vaccines are unnecessary as a reason for refusal. Asking parents why they are requesting to delay or refuse vaccines can provide a window of opportunity for providers to tailor their guidance accordingly, as suggested in the AAP's new Clinical Report "Countering Vaccine Hesitancy,"<sup>35</sup> and our data help guide the content of those conversations. Future studies should focus on specific, unique approaches that address parents who refuse and those who delay separately.

In both survey years, pediatricians reported that they were only able to convince about one-third of vaccine-refusing parents to change

their minds by providing education. A recent randomized trial assessed different communication techniques to improve measles–mumps–rubella vaccine immunization rates.<sup>36</sup> None of the strategies in the study increased parental plans to give the vaccine, and among those who had the least favorable vaccine views, the intent to immunize after the study actually declined. This finding underscores the complex psychosocial underpinnings of messages aimed at parents who delay or refuse vaccines. It illustrates the importance of initiating conversations about vaccines with an understanding of the reasons for parents' concerns, as captured in our study, to best devise effective strategies to promote vaccinations in the refusing and delaying parent.

Previous studies of vaccine hesitancy suggest that the relative rarity of vaccine-preventable diseases may have caused the public's collective memory of the consequences of these illnesses to fade, leading some parents to view vaccines as less crucial to the health of their children.<sup>19,37</sup> Our finding that the most commonly perceived reason for vaccine refusal was

that parents believe vaccines are unnecessary supports this possibility. Pediatricians continue to perceive high rates of refusals due to parental concerns about autism and/or thimerosal, but our results document for the first time that this misplaced concern has decreased in frequency in recent years (from 74.2% in 2006 to 64.3% in 2013;  $P = .002$ ), as have concerns about the safety of vaccines (from 73.7% in 2006 to 66.6% in 2013;  $P = .02$ ). If pediatricians' perceptions are correct about parental motivations for refusing vaccines, these data represent a significant shift in our understanding of the motivations behind vaccine refusals, and to our knowledge it has not been recognized in recent literature on this subject. Awareness of these misplaced perceptions can directly inform research into communication techniques to effectively address these concerns within the short duration of office visits. Pediatricians rarely listed cost as a reason for delay and refusal, and it has probably declined even more since 2013 with full implementation of the Affordable Care Act.

We identified geographic differences in the rates of vaccine refusals and patient dismissals; western pediatricians were generally more likely to experience vaccine refusals and less likely to dismiss patients. These data are similar to those of a recent study on patient dismissals<sup>34</sup> as well as US epidemiologic data showing that high rates of nonmedical exemptions and unvaccinated children are in western and midwestern US states.<sup>38-41</sup>

Although the AAP and CDC continue to encourage pediatricians to care for underimmunized and unimmunized patients,<sup>28,42</sup> our results show that increasing numbers of pediatricians

are dismissing patients for continued vaccine refusal, a finding that is in line with recently published literature on the subject.<sup>26,34</sup> Resolutions have been debated at recent AAP Annual Leadership Forum meetings to allow more flexibility in the AAP position.<sup>43,44</sup> Our data help explain the growing degree of frustration among many pediatricians when they are unable to guide families to embrace life-saving vaccines.

Our study has several limitations. First, the potential for recall bias among the respondents was present. Also, our survey results represent pediatrician impressions and perceptions about parental vaccine hesitancy and may not accurately reflect true parental attitudes and feelings about vaccines. The surveys may have limited generalizability for pediatricians who are not members of the AAP, although about 62% of board-certified pediatricians belong to the AAP.<sup>45</sup> Although there were slight differences in age between respondents and nonrespondents to both surveys, minimal response bias has been found across AAP national surveys of pediatricians.<sup>46</sup> Our analysis of data was limited because we adjusted only for variables of interest; confounders that were not included for refusal and delay analyses were practice setting, patient visits per week, percentage of patients with public health insurance, practice ownership, age, and gender (the latter 2 variables were included in the patient dismissals outcome in Table 5). In addition, the survey did not define the term alternative vaccine schedule, nor was the distinction made between parents who continually delay vaccines as a method for refusal and those who accept vaccines on an alternative schedule; therefore, the term

could have been open to different interpretations. The survey did not ask participants to identify which vaccines were most often refused. In addition, the survey did not define continued refusal when asking about patient dismissal. Because the 2006 survey did not ask about vaccine delays, respondents for that survey year may have been more likely to categorize parents who were actually delayers into the refusal questions.

## CONCLUSIONS

Pediatricians report that vaccine refusals have increased between 2006 and 2013, and they believe that parents who delay vaccines have different motivations than parents who refuse vaccines. From the perspective of the pediatricians, parents who delay vaccines may do so because of concern for their child's discomfort and concern about immune system burden, whereas vaccine refusers are more likely to believe that vaccines are unnecessary. Between 2006 and 2013, pediatricians were increasingly likely to dismiss parents who refuse vaccines despite evolving AAP recommendations to keep patients in their practice who are unvaccinated or incompletely vaccinated. More research is needed to identify effective techniques to address the concerns of vaccine-hesitant parents as identified in this report.

## ABBREVIATIONS

AAP: American Academy of Pediatrics  
CDC: Centers for Disease Control and Prevention  
CI: confidence interval  
OR: odds ratio

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**FUNDING:** Dr Hough-Telford is not privately funded. Funding for the survey was provided by the American Academy of Pediatrics (AAP) and Centers for Disease Control Childhood Immunization Support Program cooperative agreement 1, grant U66 IP000400-01, and AAP/UN Foundation grant 999-19-722200. The Periodic Survey is a program of the AAP ([www.aap.org/research/periodicsurvey](http://www.aap.org/research/periodicsurvey)); however, the views expressed in this article are those of the authors and do not represent those of the AAP.

**POTENTIAL CONFLICT OF INTEREST:** Dr Kimberlin has served as site principal investigator on 2 studies conducted by GlaxoSmithKline and Gilead, with dozens of study sites per trial and with all monies going directly to his university. The other authors have indicated they have no potential conflicts of interest to disclose.

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