

Vaccine Attitudes, Concerns, and Information Sources Reported by Parents of Young Children: Results From the 2009 HealthStyles Survey

abstract

OBJECTIVE: To describe the vaccine-related attitudes, concerns, and information sources of US parents of young children.

METHODS: We calculated weighted proportions and 95% confidence intervals for vaccine-related attitudes, concerns, and information sources of parents with at least 1 child aged 6 years or younger who participated in the 2009 HealthStyles survey.

RESULTS: The overall response rate for the survey was 65% (4556 of 7004); 475 respondents were parents or guardians ("parents") of at least 1 child aged 6 years or younger. Among those respondents, nearly all (93.4%) reported that their youngest child had or would receive all recommended vaccines. The majority of parents reported believing that vaccines were important to children's health (79.8%) and that they were either confident or very confident in vaccine safety (79.0%). The vaccine-related concern listed most often by parents was a child's pain from the shots given in 1 visit (44.2%), followed by a child getting too many vaccines at 1 doctor's visit (34.2%). When asked to list their most important sources of information on vaccines, the most common response was a child's doctor or nurse (81.7%).

CONCLUSIONS: To maintain and improve on the success of childhood vaccines in preventing disease, a holistic approach is needed to address parents' concerns in an ongoing manner. Listening and responding in ways and with resources that address specific questions and concerns could help parents make more informed vaccination decisions. *Pediatrics* 2011;127:S92–S99

AUTHORS: Allison Kennedy, MPH,^a Michelle Basket, BS,^b and Kristine Sheedy, PhD^b

^aImmunization Services Division and ^bHealth Communication Science Office, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia

KEY WORDS

vaccines, attitudes, parents

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

www.pediatrics.org/cgi/doi/10.1542/peds.2010-1722N

doi:10.1542/peds.2010-1722N

Accepted for publication Nov 29, 2010

Address correspondence to Allison Kennedy, MPH, 1600 Clifton Rd NE, Mail Stop E-52, Atlanta, GA 30333. E-mail: akennedy@cdc.gov

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

Copyright © 2011 by the American Academy of Pediatrics

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

Parental acceptance of routine childhood immunization is essential to protecting children's health, because high vaccination-coverage rates result in decreased rates of vaccine-preventable diseases in the United States. Although concern over the safety or necessity of vaccination is not a new phenomenon,¹ the perception among some parents that vaccines are unsafe for their children has been heightened in recent years by several factors including the number of vaccines in the recommended childhood immunization schedule,² the presence of conflicting vaccine-safety information and misinformation online and elsewhere,^{3,4} and scientifically refuted yet widely publicized theories that link vaccines to chronic health problems or developmental disabilities such as autism.⁵ Paradoxically, the overall success of the US childhood vaccination program can help perpetuate these concerns. Because vaccine-preventable disease rates are low in the United States, parents who have no personal experience with vaccine-preventable diseases might focus their attention on the perceived risks of vaccines instead of their well-documented benefits.⁶

Parents who question the necessity or safety of vaccines for infants may ultimately choose to either decline or delay vaccination, which will leave their children vulnerable to disease. In addition, an unvaccinated child in a community threatens the health protection afforded to those in their community who are too young to be vaccinated and those for whom immunization is contraindicated. Although immunization is compulsory for school entry in the United States, parents in all but 2 states can opt out of some or all vaccines for either religious or personal reasons, depending on state law.⁷ Furthermore, although school-entry laws act as a "safety net" for immunization

of school-aged children, immunization of infants and young children is not compulsory unless a child attends day care, where most states also allow nonmedical exemptions.⁸

Past research has explored the association between vaccine concerns and exemption to compulsory vaccination for school entry,^{9–12} immunization coverage,^{13–15} and vaccine-preventable disease incidence.^{7,16–19} The vaccine-related attitudes and beliefs of parents are also well documented.^{2,20–25} However, to communicate effectively with parents about vaccines and vaccine-preventable diseases, it is necessary to assess their vaccine-related attitudes and concerns continually. Our objective with this analysis was to describe the vaccine-related attitudes, concerns, and information sources of US parents in 2009.

METHODS

HealthStyles Survey

We used the HealthStyles consumer mail panel survey as the source of information for this study. HealthStyles is part of an annual series of consumer mail surveys. The first in this annual series, ConsumerStyles, was sent to a stratified random sample of 21 420 households that participate in occasional surveys as members of a consumer mail panel. The survey focuses on a wide range of consumer purchasing and media attitudes and behaviors. HealthStyles, which focuses specifically on health-related attitudes and behaviors, was sent to a random sample of 7004 ConsumerStyles respondents as a follow-up survey. The ConsumerStyles and HealthStyles methods are described in greater detail elsewhere, including a discussion of the mail panel survey methodology and the representativeness of HealthStyles data compared with the Behavioral Risk Factor Surveillance System survey, a probability sample survey.²⁶

Questions regarding vaccine-related attitudes, concerns, and information sources were included in the 2009 HealthStyles survey, which was fielded from August through September. Question format varied and included 5- and 10-point Likert-type scale, yes/no, and multiple-choice questions. Participant demographic characteristics were taken from the existing mail panel database and were not included on the survey instrument. The secondary analysis described here was exempt from human subjects review by the Centers for Disease Control and Prevention institutional review board, because the data were nonidentifiable.

Analysis

We calculated weighted proportions and 95% confidence intervals for demographic characteristics and vaccine-related attitudes, concerns, and information sources of parents with at least 1 child aged 6 years or younger who participated in the 2009 HealthStyles survey. All survey data were weighted by using the Current Population Survey of the US Census to be representative of the US population for gender, age, income, race, and household size. SPSS 14.0 (SPSS Inc, Chicago, IL) was used for all analyses.

RESULTS

Response Rate and Demographic Characteristics of the 2009 HealthStyles Survey

The overall response rate for the 2009 HealthStyles survey was 65% (4556 of 7004). We restricted the analysis to the 475 respondents with at least 1 child aged 6 years or younger ("parents"). The majority of parents surveyed were female (60.2%) and white (59.4%) and reported educational attainment of some college or higher (63.8%) (Table 1). Nearly all parents reported that their youngest child had already received (74.5%) or would receive

TABLE 1 Demographic Characteristics of HealthStyles Respondents With at Least 1 Child Aged 6 Years or Younger, 2009 (*N* = 475)

	Unweighted <i>n</i>	Weighted %	95% Confidence Interval
Respondent gender			
Male	212	39.8	35.7–43.8
Female	263	60.2	56.2–64.3
Respondent age			
18–24 y	24	24.1	20.6–27.6
25–34 y	206	44.9	40.8–49.0
≥35 y	245	31.1	27.2–34.9
Respondent race/ethnicity			
Non-Hispanic white	261	59.4	55.3–63.4
Non-Hispanic black	73	12.9	10.3–15.9
Hispanic	95	21.1	17.9–24.6
Other	46	6.6	4.8–8.9
Household income			
Less than \$25 000	102	20.5	17.4–24.1
\$25 000–\$39 999	88	23.8	20.4–27.5
\$40 000–\$59 999	86	19.4	16.2–22.8
\$60 000 or more	199	36.2	32.4–40.4
Respondent education ^a			
High school graduate or less	150	36.1	32.2–40.2
Some college	173	35.9	31.9–39.8
College graduate	100	19.2	16.0–22.6
Postgraduate	51	8.7	6.6–11.3

^a Unweighted *n* for respondent education = 474.

(18.9%) all recommended vaccines (Table 2).

Vaccine-Related Attitudes and Concerns

Parents reported their attitudes regarding the safety and necessity of

vaccines (Tables 2 and 3). The majority of the parents were either confident or very confident in vaccine safety (79.0%) and believed that vaccines are important to children's health (79.8%). Similarly, 73% of the parents somewhat or strongly agreed that the bene-

fits of vaccines outweighed the risks. Most parents (72.7%) were comfortable or very comfortable with the number of vaccines that children receive in their first 2 years of life; however, 21.9% of the parents did somewhat or strongly agree that they were concerned about too many vaccines potentially damaging a child's immune system. When asked how many shots parents were comfortable with their child receiving in 1 doctor's visit, the most common response was 1 to 2 (42.2%), followed by 3 to 4 (33.6%), and "whatever the doctor recommends" (22.5%).

Parents were asked to respond to a series of 11 potential vaccine-related concerns and were also given the option of stating that they had no vaccine-related concerns (Table 4). Just more than one-fifth (20.8%) of the parents reported that none of the 11 issues listed were of concern to them. The most common concern reported by the parents was that it is painful for children to receive multiple shots during 1 doctor's visit (44.2%). Other concerns reported by >25% of the parents included their child receiving too many vaccines in 1 doctor's visit (34.2%), vaccines causing fevers in their child (28.3%), children getting too many vaccines in their first 2 years of life (27.8%), and vaccines causing learning disabilities such as autism (26.2%).

Vaccine-Information Sources and the Role of the Health Care Provider

Parents were asked to name the 3 most important sources that have helped them make decisions about vaccinating their youngest child (Table 5). By far, the most common response was their child's doctor or nurse (81.7%). Parents were also asked several additional questions about the role of their child's health care provider in vaccine communication (Table

TABLE 2 Attitudes and Behaviors Regarding Vaccination Decisions of HealthStyles Respondents With at Least 1 Child Aged 6 Years or Younger, 2009 (*N* = 475)

	Weighted %	95% Confidence Interval
I have given a lot of thought to my decision concerning vaccination for my child		
Strongly/somewhat agree	70.8	67.0–74.5
Neither agree nor disagree	19.8	16.7–23.3
Strongly/somewhat disagree	9.4	7.3–12.1
I am worried about vaccinating my youngest child		
Strongly/somewhat agree	12.3	9.8–15.3
Neither agree nor disagree	12.6	10.0–15.5
Strongly/somewhat disagree	75.1	71.4–78.5
I am unsure about vaccinating my youngest child		
Strongly/somewhat agree	10.5	8.1–13.2
Neither agree nor disagree	12.1	9.6–15.0
Strongly/somewhat disagree	77.4	73.9–80.8
Which of the following best describes your plans for vaccinating your youngest child?		
Has already received all recommended vaccines	74.5	70.8–78.1
Will receive all recommended vaccines	18.9	15.8–22.3
Will receive some but not all recommended vaccines	5.5	3.8–7.6
Will receive none of the recommended vaccines	1.1	0.5–2.2
What is the most number of vaccine shots you are comfortable with your youngest child getting in 1 doctor's visit?		
None	1.3	0.6–2.5
1–2	42.2	38.3–46.5
3–4	33.6	29.8–37.7
≥5	0.4	0.1–1.2
Whatever the doctor recommends	22.5	19.1–26.0

TABLE 3 Vaccine Attitudes of HealthStyles Respondents With at Least 1 Child Aged 6 Years or Younger, 2009 (*N* = 475)

	Weighted %	95% Confidence Interval
My child could get a serious disease if he or she were not vaccinated		
Strongly/somewhat agree	78.7	75.2–82.0
Neither agree nor disagree	17.2	14.2–20.5
Strongly/somewhat disagree	4.1	2.7–6.0
It is important to vaccinate my child in order to prevent the spread of disease in my community		
Strongly/somewhat agree	85.6	82.4–88.2
Neither agree nor disagree	10.0	7.7–12.7
Strongly/somewhat disagree	4.5	3.0–6.4
I am concerned that my child's immune system could be weakened by too many vaccines		
Strongly/somewhat agree	21.9	18.6–25.4
Neither agree nor disagree	29.8	26.2–33.8
Strongly/somewhat disagree	48.3	44.2–52.4
The benefits of vaccines outweigh the risks of vaccines		
1–3 (strongly disagree)	5.8	4.0–7.9
4–7	21.2	17.9–24.7
8–10 (strongly agree)	73.0	69.1–76.5
In general, how safe do you think vaccines are for children?		
1–3 (not at all safe)	4.3	2.9–6.2
4–7	25.2	21.7–28.9
8–10 (very safe)	70.5	66.7–74.2
How important do you think immunizations are for keeping children healthy?		
1–3 (not at all important)	2.8	1.7–4.5
4–7	17.2	14.3–20.5
8–10 (very important)	79.8	76.4–83.1
If children in the US are not vaccinated, how likely do you think they are to get a disease that vaccines prevent?		
1–3 (not at all likely)	8.8	6.7–11.4
4–7	35.2	31.3–39.2
8–10 (very likely)	56.0	51.9–60.1
How confident are you in the safety of routine childhood vaccines?		
Very confident	36.2	32.4–40.3
Confident	42.8	38.8–47.1
Somewhat confident	16.3	13.5–19.6
Not at all confident	4.7	3.1–6.7
How comfortable are you with the recommended number of childhood vaccines in the first 2 years of a baby's life?		
Very comfortable	30.0	26.3–33.9
Comfortable	42.7	38.7–46.9
Somewhat comfortable	20.2	17.1–23.8
Not at all comfortable	7.1	5.3–9.6

6). Most parents (83.3%) somewhat or strongly agreed that their child's health care provider has strongly recommended vaccinating their child, and 86.5% somewhat or strongly agreed that they usually follow the health care provider's advice. The majority of parents (60.7%) said that they usually ask from 1 to 3 questions about vaccines during a routine office visit, and 84.0% somewhat or strongly agreed that they trust the vaccine advice they get from their child's health care provider.

DISCUSSION

Overall, parents reported positive attitudes about vaccines; most of them felt that vaccines were important to their children's health and were confident in vaccine safety. Although parents reported a variety of different vaccine-related concerns, the most common concern was that vaccines were painful for their children; many of them were also concerned about the number of vaccines that their children re-

ceive and about potential short-term (eg, fever, pain) and long-term adverse effects after vaccination. These findings highlight the need to address parents' specific questions and concerns about vaccines, even among parents whose overall confidence in vaccines is high. As in past research, parents in our survey cited health care providers as the most important source of information when making decisions about vaccines.^{2,11}

Vaccine-Related Attitudes and Concerns

The majority of the parents reported high overall confidence in vaccine safety, a finding that is reinforced by high vaccination-coverage levels among both infants and school-aged children in the United States, as well as the low proportion of infants nationally (0.6%) who have received no vaccines.^{27,28} Most parents also believe that vaccines are important to children's health; however, given that ~1 in 5 of the parents surveyed were not fully confident in the safety or importance of vaccines, education regarding the benefits of vaccines and the potential dangers of the diseases they prevent are still important components of vaccine communication. It is not surprising that low perceived susceptibility to or severity of vaccine-preventable diseases, along with concerns about vaccine safety, have been associated with vaccine refusal by parents.^{9,21,22,29} Our findings are consistent with the results of both past and recent research on parental vaccine attitudes.^{2,25} In a telephone survey of parents of young children conducted in 1999, Gellin et al² reported that parents were supportive of vaccines overall, yet approximately one-fourth of them were concerned about the number of vaccines children receive and the perceived negative effect of vaccines on a child's immune system. Recent work by Freed et al²⁵

TABLE 4 Vaccine-Related Concerns of HealthStyles Respondents With at Least 1 Child Aged 6 Years or Younger, 2009 (*N* = 475)

	Weighted %	95% Confidence Interval
It is painful for children to receive so many shots during 1 doctor's visit	44.2	40.1–48.3
My child getting too many vaccines in 1 doctor's visit	34.2	30.3–38.2
Vaccines causing fevers in my child	28.3	24.7–32.1
Children get too many vaccines during the first 2 years of life	27.8	24.1–31.6
Vaccines may cause learning disabilities (such as autism)	26.2	22.6–29.9
The ingredients in vaccines (what vaccines are made of) are unsafe	22.1	18.9–25.8
I have no concerns about childhood vaccines	20.8	17.7–24.5
Vaccines are given to children to prevent diseases that they are not likely to get	14.2	11.6–17.4
Vaccines may cause chronic disease (such as diabetes, asthma, or immune system problems)	13.5	10.9–16.6
Vaccines are not tested enough for safety	13.2	10.6–16.2
My child will not be vaccinated on time because there are not enough of some vaccines	9.7	7.4–12.3
Vaccines are given to children to prevent diseases that are not serious	6.8	4.9–9.1

TABLE 5 Vaccine-Information Sources of HealthStyles Respondents With at Least 1 Child Aged 6 Years or Younger, 2009 (*N* = 475)

	Weighted %	95% Confidence Interval
How much information about specific immunization safety issues will you try to find before your youngest child's next vaccination?		
A lot	20.7	17.5–24.2
Some	22.4	19.0–26.0
A little	11.9	9.4–14.8
None	11.5	8.9–14.2
Does not apply, my child has already had all recommended vaccines	33.5	29.7–37.5
What are the 3 most important sources of information that have helped you make decisions about your youngest child's vaccinations?		
My child's health care provider, such as a doctor or nurse	81.7	78.4–84.8
Family	47.3	43.3–51.6
My child's other parent	23.0	19.7–26.7
Friends	22.5	19.2–26.1
American Academy of Pediatrics	20.9	17.7–24.5
Centers for Disease Control and Prevention	14.9	12.1–18.0
Internet	9.9	7.7–12.7
Other	7.2	5.2–9.5
Magazines	5.0	3.4–7.1
Television news shows	3.2	2.0–4.9
Newspapers	2.7	1.6–4.3
Complementary health care provider, such as a chiropractor or homeopath	2.0	1.1–3.4
Daytime or entertainment television shows	0.9	0.3–2.0
Radio	0.3	0.1–1.1

among parents of young children and adolescents also revealed that confidence in the necessity of vaccines to protect children's health was high, yet concerns about issues such as potential adverse effects were common.²⁵

Despite overall confidence in vaccines, parents in our survey did report their

specific vaccine concerns. Our findings emphasize that parents' vaccine-related concerns vary and, as a consequence, effective communication will likely need to be responsive to the array of concerns that individual parents are most likely to feel and consider. A child's pain from vaccines was the

most common concern among respondents, and concerns about the number of vaccines and potential short-term and long-term adverse effects were also common. Of the potential concerns listed on our survey, the most common fell into broad categories such as number and timing of vaccines, potential adverse effects or reactions (both short-term and long-term), and vaccine ingredients. Past research reports have described parental vaccine attitudes as a spectrum rather than a dichotomy and have similarly suggested the need for communication approaches that recognize individual information needs.^{20,25} For example, Gust et al²⁰ described some parents as "fence-sitters"—parents who are uncertain about whether the benefits of vaccines outweigh the risks, although their children are currently being vaccinated. Another important aspect of ongoing research will be to continue to assess these subgroups of parents over time to find whether they grow in number, how their concerns change over time, and if these concerns are associated with vaccine delay or refusal. Research is currently underway to address each of these questions.

These findings also underscore the potential importance of pharmacologic and behavioral interventions in addressing the most common overall concern among parents: their child's pain from vaccination. Interventions such as breastfeeding, sweet-tasting solutions, pacifiers, distraction, and topical local anesthetics have been associated with decreased pain and crying time for infants.^{30–33} In addition to benefiting the infant, such measures may also benefit the parent, because parental stress has been found to be significantly related to infants' crying time.³³ Making the immunization encounter less painful for infants and less stressful for parents may also

TABLE 6 Attitudes Regarding Health Care Providers of HealthStyles Respondents With at Least 1 Child Aged 6 Years or Younger, 2009 (*N* = 475)

	Weighted %	95% Confidence Interval
My child's health care provider has strongly recommended that I vaccinate my child		
Strongly/somewhat agree	83.3	80.0–86.2
Neither agree nor disagree	9.6	7.3–12.2
Strongly/somewhat disagree	7.2	5.3–9.6
I usually follow the advice of my child's health care provider		
Strongly/somewhat agree	86.5	83.5–89.2
Neither agree nor disagree	8.9	6.8–11.6
Strongly/somewhat disagree	4.6	3.1–6.7
My child's main health care provider is easy to talk to		
Strongly/somewhat agree	87.1	84.3–89.8
Neither agree nor disagree	12.1	9.5–15.0
Strongly/somewhat disagree	0.7	0.2–1.7
I trust the vaccine advice my child's main health care provider gives me		
Strongly/somewhat agree	84.0	80.8–86.9
Neither agree nor disagree	10.8	8.4–13.6
Strongly/somewhat disagree	5.2	3.6–7.3
How many questions about vaccines do you ask your youngest child's health care provider during a routine visit?		
None	20.9	17.7–24.4
1–3	60.7	56.6–64.7
4–6	15.3	12.5–18.5
≥7	3.1	1.9–4.8
Do you always do what the health care provider recommends when making decisions about the safety of vaccines for your youngest child?		
Yes	75.6	71.9–79.0
No	24.4	21.0–28.1

help to reduce the number of concerns parents have about vaccines in general. Teaching parents and empowering them to use evidence-based, soothing interventions that they can offer their children during vaccine administration might help parents have more of a sense of control and engagement in each immunization encounter. Memorable events over which a person feels that he or she has little control, such as a stressful immunization encounter, are perceived as presenting a higher level of risk than more mundane events that a person feels able to influence.³⁴

Vaccine-Information Sources and the Role of the Health Care Provider

Our results regarding vaccine-information sources are similar to those from past research, which have

repeatedly indicated that health care providers are parents' preferred and trusted source of vaccine information.^{2,11} Given the potential complexity of vaccine communication and the competing demands of the well-child visit, vaccine-communication resources are available for health care providers to supplement discussions with parents regarding questions or concerns that may arise regarding childhood immunization. In partnership with the American Academy of Pediatrics and the American Academy of Family Physicians, the Centers for Disease Control and Prevention has developed "Provider Resources for Vaccine Conversations With Parents" (www.cdc.gov/vaccines/conversations). These resources were developed with extensive input from parents and include information for health care providers on communicat-

ing effectively with parents about vaccines, as well as information about vaccine-preventable diseases and vaccine safety.

Resources are also available to help health care providers address some of the specific concerns raised by parents in our survey. For example, Vaccine Information Statements (www.cdc.gov/vaccines/pubs/vis) are required by law to be provided to each child's legal representative (eg, parent, guardian) before administration to the child of any vaccine that is covered by the National Vaccine Injury Compensation Program.³⁵ Along with information on specific vaccines and vaccine-preventable diseases, the statements contain information on vaccination benefits and risks, including common vaccine reactions such as fever. Other resources, such as those available from the California Department of Health (www.cdph.ca.gov/programs/immunize/Pages/ComfortMeasuresforInfants.aspx), offer suggestions on how to reduce pain and anxiety of immunizations for infants and young children. As a final example, the American Academy of Pediatrics (www.aap.org/immunization/families/toomany.html) offers resources for parents to help explain the reasons for the number and timing of vaccines on the recommended immunization schedule and to describe the safety of simultaneous administration of vaccines.

Limitations

These findings are subject to several potential limitations. First, because the attitudes and concerns are self-reported, they are subject to social-desirability bias; that is, parents may feel compelled to give a socially expected answer when discussing their children's health rather than report their actual attitudes or behaviors. The mail survey, which is filled out by the

respondent without the help of an interviewer, might have helped to minimize the potential for this bias. Second, because these surveys did not attempt to verify the immunization status of the respondents' children, we do not know if or how a respondent's vaccine attitudes or concerns affected their actual behavior. Similarly, we are unable to interpret causality because of the cross-sectional nature of the data. Finally, at 65% the response rate of the survey was low, and it is possible that nonrespondents would have answered the questions in a sys-

tematically different way. The data were weighted in part to address this potential nonresponse bias.

CONCLUSIONS

Our survey revealed that although parental confidence in vaccine safety is high, several vaccine-related concerns, such as pain from vaccine administration, postvaccination fevers, and the number of vaccines given at once, were common among parents of young children. Health care providers continue to be parents' most trusted source of vaccine information and ad-

vice. To maintain and improve on the success of childhood vaccines in preventing disease, a holistic approach is needed to address these issues in an ongoing manner. Understanding that parents have different questions, concerns, and information needs is the first step. Listening and responding in ways and with resources that address their specific questions and concerns, along with utilization of comfort measures that can make immunization visits less stressful for both child and parent, might help parents make more informed vaccination decisions.

REFERENCES

1. Wolfe RM, Sharp LK. Anti-vaccinationists past and present. *BMJ*. 2002;325(7361):430–432
2. Gellin BG, Maibach EW, Marcuse EK. Do parents understand immunizations? A national telephone survey. *Pediatrics*. 2000;106(5):1097–1102
3. Zimmerman RK, Wolfe RM, Fox DE, et al. Vaccine criticism on the world wide web. *J Med Internet Res*. 2005;7(2):e17
4. Wolfe RM, Sharp LK, Lipsky MS. Content and design attributes of antivaccination websites. *JAMA*. 2002;287(24):3245–3248
5. Baker JP. Mercury, vaccines, and autism: one controversy, three histories. *Am J Public Health*. 2008;98(2):244–253
6. Chen RT. Vaccine risks: real, perceived, and unknown. *Vaccine*. 1999;17(suppl 3):S41–S46
7. Omer SB, Pan WKY, Halsey NA, et al. Nonmedical exemptions to school immunization requirements: secular trends and association of state policies with pertussis incidence. *JAMA*. 2006;296(14):1757–1763
8. Orenstein WA, Hinman AR. The immunization system in the United States: the role of school immunization laws. *Vaccine*. 1999;17(suppl 3):S19–S24
9. Salmon DA, Moulton LH, Omer SB, DeHart MP, Stokley S, Halsey NA. Factors associated with refusal of childhood vaccines among parents of school-aged children: a case-control study. *Arch Pediatr Adolesc Med*. 2005;159(5):470–476
10. Thompson JW, Tyson S, Card-Higginson P, et al. Impact of addition of philosophical exemptions on childhood immunization rates. *Am J Prev Med*. 2007;32(3):194–201
11. Omer SB, Salmon DA, Orenstein WA, deHart MP, Halsey N. Vaccine refusal, mandatory immunization, and the risks of vaccine-preventable diseases. *N Engl J Med*. 2009;360(19):1981–1988
12. Salmon DA, Sotir MJ, Pan WK, et al. Parental vaccine refusal in Wisconsin: a case-control study. *WMMJ*. 2009;108(1):17–23
13. Bardenheier B, Yusuf H, Schwartz B, Gust D, Barker L, Rodewald L. Are parental vaccine safety concerns associated with receipt of measles-mumps-rubella, diphtheria and tetanus toxoids with acellular pertussis, or hepatitis B vaccines by children? *Arch Pediatr Adolesc Med*. 2004;158(6):569–575
14. Gust DA, Strine TW, Maurice E, et al. Underimmunization among children: effects of vaccine safety concerns on immunization status. *Pediatrics*. 2004;114(1). Available at: www.pediatrics.org/cgi/content/full/114/1/e16
15. Smith PJ, Chu SY, Barker LE. Children who have received no vaccines: who are they and where do they live? *Pediatrics*. 2004;114(1):187–195
16. Salmon DA, Haber M, Gangarosa EJ, Phillips L, Smith NJ, Chen RT. Health consequences of religious and philosophical exemptions from immunization laws: individual and societal risk of measles. *JAMA*. 1999;282(1):47–53
17. Feikin DR, Lezotte DC, Hamman RF, Salmon DA, Chen RT, Hoffman RE. Individual and community risks of measles and pertussis associated with personal exemptions to immunization. *JAMA*. 2000;284(24):3145–3150
18. Parker AA, Staggs W, Dayan GH, et al. Implications of a 2005 measles outbreak in Indiana for sustained elimination of measles in the United States. *N Engl J Med*. 2006;355(5):447–455
19. Omer SB, Enger KS, Moulton LH, Halsey NA, Stokley S, Salmon DA. Geographic clustering of nonmedical exemptions to school immunization requirements and associations with geographic clustering of pertussis. *Am J Epidemiol*. 2008;168(12):1389–1396
20. Gust D, Brown C, Sheedy K, Hibbs B, Weaver D, Nowak G. Immunization attitudes and beliefs among parents: beyond a dichotomous perspective. *Am J Health Behav*. 2005;29(1):81–92
21. Sturm LA, Mays RM, Zimet GD. Parental beliefs and decision making about child and adolescent immunization: from polio to sexually transmitted infections. *J Dev Behav Pediatr*. 2005;26(6):441–452
22. Benin AL, Wisler-Scher DJ, Colson E, Shapiro ED, Holmboe ES. Qualitative analysis of mothers' decision-making about vaccines for infants: the importance of trust. *Pediatrics*. 2006;117(5):1532–1541
23. Shui IM, Weintraub ES, Gust DA. Parents concerned about vaccine safety: differences in race/ethnicity and attitudes. *Am J Prev Med*. 2006;31(3):244–251
24. Gust DA, Darling N, Kennedy A, Schwartz B. Parents with doubts about vaccines: which vaccines and reasons why. *Pediatrics*. 2008;122(4):718–725
25. Freed GL, Clark SJ, Butchart AT, Singer DC, Davis MM. Parental vaccine safety concerns in 2009. *Pediatrics*. 2010;125(4):654–659
26. Pollard W. Use of consumer panel survey data for public health communication planning: an evaluation of survey results. Presented at: annual meeting of the American Statistical Association; August 11–15, 2002; New York, NY
27. Centers for Disease Control and Prevention. Vaccination coverage among children in kindergarten: United States, 2006–07

- school year. *MMWR Morb Mortal Wkly Rep*. 2007;56(32):819–821
28. Centers for Disease Control and Prevention. National, state, and local area vaccination coverage among children aged 19–35 months: United States, 2008. *MMWR Morb Mortal Wkly Rep*. 2009;58(33):921–926
 29. Downs JS, deBruin WB, Fischhoff B. Parents' vaccination comprehension and decisions. *Vaccine*. 2008;26(12):1595–1607
 30. Chambers CT, Taddio A, Uman LS, McMurtry CM; HELPinKIDS Team. Psychological interventions for reducing pain and distress during routine childhood immunizations: a systematic review. *Clin Ther*. 2009;31(S2):S77–S103
 31. Shah V, Taddio A, Rieder MJ; HELPinKIDS Team. Effectiveness and tolerability of pharmacologic and combined interventions for reducing injection pain during routine childhood immunizations: systematic review and meta-analyses. *Clin Ther*. 2009;31(suppl 2):S104–S151
 32. Felt BT, Mollen E, Diaz S, et al. Behavioral interventions reduce infant distress at immunization. *Arch Pediatr Adolesc Med*. 2000;154(7):719–724
 33. Mörelius E, Theodorsson E, Nelson N. Stress at three-month immunization: parents' and infants' salivary cortisol response in relation to the use of pacifier and oral glucose. *Eur J Pain*. 2009;13(2):202–208
 34. Ball LK, Evans G, Bostrom A. Risky business: challenges in vaccine risk communication. *Pediatrics*. 1998;101(3 pt 1):453–458
 35. Health Resources and Services Administration. VICP authorizing legislation. Available at: www.hrsa.gov/vaccinecompensation/authorizinglegislation.pdf. Accessed March 17, 2010

Vaccine Attitudes, Concerns, and Information Sources Reported by Parents of Young Children: Results From the 2009 HealthStyles Survey

Allison Kennedy, Michelle Basket and Kristine Sheedy

Pediatrics 2011;127;S92

DOI: 10.1542/peds.2010-1722N originally published online April 18, 2011;

Updated Information & Services

including high resolution figures, can be found at:
http://pediatrics.aappublications.org/content/127/Supplement_1/S92

References

This article cites 32 articles, 7 of which you can access for free at:
http://pediatrics.aappublications.org/content/127/Supplement_1/S92#BIBL

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):
Infectious Disease
http://www.aappublications.org/cgi/collection/infectious_diseases_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Vaccine Attitudes, Concerns, and Information Sources Reported by Parents of Young Children: Results From the 2009 HealthStyles Survey

Allison Kennedy, Michelle Basket and Kristine Sheedy

Pediatrics 2011;127;S92

DOI: 10.1542/peds.2010-1722N originally published online April 18, 2011;

The online version of this article, along with updated information and services, is located on the World Wide Web at:

http://pediatrics.aappublications.org/content/127/Supplement_1/S92

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 345 Park Avenue, Itasca, Illinois, 60143. Copyright © 2011 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®

