

# Health Service Applications

## Parental Vaccine Beliefs and Child's School Type

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**T**he school system plays an important role in a child's vaccination status, whether by directly offering immunization services, maintaining immunization records, or providing an incentive for up-to-date immunizations through the enforcement of school entry laws.<sup>1-3</sup> Within the American educational system, however, children do not all attend the same type of school. While most children attend public schools, a variety of educational options—including secular and religiously affiliated private schools and homeschools—are available.<sup>4</sup> School-related factors, including school-based informational campaigns, private school attendance, and higher socioeconomic status of the student body, have been associated with immunization compliance among middle school students, and rates of immunization compliance also differ by school type.<sup>5,6</sup>

Therefore, the vaccine-related beliefs of parents also might differ depending on the type of school their child attends. This study examined the vaccination beliefs of parents with children in different educational settings, with a specific focus on homeschools, which are least likely to be influenced by and subject to the rules that apply to the public education system, including those mandating immunization. While this study is cross-sectional, and therefore unable to address causality regarding parental beliefs, these results can be used to suggest and highlight potential differences in the beliefs and behaviors of parents, which will be explored further in future research. These results also can be used to guide the development of tailored messages for use in vaccine communication with parents, research that has been previously suggested as a way of addressing differences in vaccination coverage levels between different types of schools.<sup>6</sup>

### METHODS

#### Survey

Data from the 2003 HealthStyles survey were used for analysis. HealthStyles has been administered every year since 1995 as a follow-up to the ConsumerStyles mail panel survey. ConsumerStyles is produced from a panel of 600,000 households representing a range of demographic characteristics who have agreed to respond to periodic mail surveys. Ten thousand adult panel members were selected through stratified random

sampling to receive the ConsumerStyles survey from May through June 2003. Of these 10,000 households, 5873 returned the survey, yielding a 59% response rate. HealthStyles surveys, which included follow-up questions about health beliefs, attitudes, social norms, and behaviors, were then sent in July and August 2003 to households that responded to the ConsumerStyles survey. Twenty-eight ConsumerStyles respondents were lost to follow-up; therefore, 5845 HealthStyles surveys were sent.

Data from the HealthStyles survey were weighted to the 2002 US Current Population Survey on age, sex, race, household size, and household income. Although HealthStyles is not a probability sampling survey, it has shown a high correlation with responses to similar questions asked on the Behavioral Risk Factor Surveillance System Survey, a national probability sampling survey on health behaviors.<sup>7</sup> HealthStyles data have been used previously in several areas of health research to analyze the knowledge, attitudes, and behaviors of the US population.<sup>8-13</sup>

#### Study Population and Variables of Interest

Respondents were included in the analysis if they were the parent or guardian of at least 1 child aged 0-18 years and answered the survey question, "What type of school does your youngest child attend?" Potential responses included the following: public, private/religious, private/nonreligious, charter, home, and other. Parents also were asked to indicate if their youngest child was not yet in school. The 2 private school categories were collapsed together, as were the charter and public school categories (since charter schools are a type of public school). Parents were excluded from the analysis if they answered that their youngest child attended another type of school or that they were not yet in school (3% and 29% of parents with children aged 0-18 years, respectively). The youngest child was chosen as a reference because his/her vaccinations would likely be the most recent, and therefore parents' vaccination beliefs and behaviors would reflect this more recent experience with vaccine-related decision making. Independent belief variables were assessed in 5 categories: vaccine safety concerns, beliefs in vaccine importance, overall trust in the government and the health care system, sources of vaccine information, and vaccine laws and exemptions. Background and sociodemographic characteristics of respondents also were analyzed. Because data for the study were collected by a market research firm, and all responses

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were anonymous, Institutional Review Board approval was not required.

## Statistical Analysis

Percentages of responses for each survey question were calculated, stratified by the school type of the respondents' youngest child. Chi-square tests also were used to test for statistical differences (defined as  $p < 0.05$ ) between parental beliefs and school type. All statistical analyses were conducted using SPSS software, version 12.0 (SPSS, Inc, Chicago, Ill).

## RESULTS

### Response Rate and Demographic Characteristics

The response rate for the HealthStyles survey was 69% (4035/5845). A weighted subsample of 936 parents reported having at least one child in a public school (82%), private school (15%), or homeschool (3%) (Table 1). Respondents differed significantly by school type ( $p < 0.05$ ) regarding education level, household income, and age but were similar with regard to race (Table 2). Parents whose children attended private school had the highest proportion whose educational attainment included some college or higher (88%), followed by homeschool (82%) and public school (67%) parents. Likewise, private school parents also had the greatest proportion of respondents with a household income of \$50,000 or higher (71%), followed by public school (57%) and homeschool (43%) parents. Most parents across groups reported being between 30 and 44 years of age, with 60% of public school, 51% of private school, and 63% of homeschool parents falling into this category. Most respondents were white in all 3 school types (70%, 78%, and 68% for public schools, private schools, and homeschools, respectively).

### Vaccine Safety and Importance Beliefs

Parental beliefs regarding vaccine safety and importance differed depending on their child's school type

Table 1  
School Type of Respondents' Youngest Child:  
HealthStyles, 2003\*

School Type <sup>†</sup>	n (%)
Public	765 (82)
Private	144 (15)
Home	27 (3)
Total	936 (100)

\* Results are weighted to the 2002 US Census Current Population Survey.

<sup>†</sup> School types were defined as follows: Public, public or charter schools; Private, nonpublic schools with or without a religious affiliation; Home, child educated at home. Parents who responded "other" or "my youngest child is not yet in school" to this question were excluded from further analysis.

(Table 3). Overall, 73% of parents believed vaccines are safe or very safe. This proportion was lower among homeschooling parents (52%), than among public (73%) and private school (74%) parents ( $p = 0.05$ ). Concern that vaccines may cause learning disabilities also was higher among homeschooling parents (30%) than among public (13%) and private (18%) school parents ( $p = 0.02$ ). Regarding the importance of vaccines, 86% of parents believed vaccines were important or very important to children's health. Again, this proportion was lower among homeschooling parents (54%) than among public (87%) and private (88%) school parents ( $p < 0.01$ ). A similar pattern was seen when parents were asked about their concerns regarding severity of and susceptibility to vaccine-preventable diseases. At 25%, homeschools had the largest proportion of parents who were concerned that vaccines are given to prevent nonserious illnesses, compared to 10% and 4% of public and private school parents, respectively ( $p < 0.01$ ). Similarly, 25% of homeschool parents were concerned that vaccines were given to prevent illnesses that children are unlikely to get, compared to 13% of public and 8% of private school parents ( $p = 0.04$ ).

Table 2  
Respondents' Demographic Characteristics  
Stratified by Youngest Child's School Type:  
HealthStyles, 2003\*

Variable	Public, n (%)	Private, n (%)	Home, n (%)	Total, N (%)
<b>Level of educational attainment<sup>†</sup></b>				
Less than 12 years	41 (6)	1 (1)	2 (7)	44 (5)
High school graduate	203 (27)	15 (11)	3 (11)	221 (24)
Some college	287 (39)	46 (33)	16 (59)	349 (39)
College graduate	140 (19)	43 (31)	5 (19)	188 (21)
Graduate school	70 (9)	33 (24)	1 (4)	104 (12)
<b>Annual household income<sup>†</sup></b>				
\$0-24,999	140 (18)	13 (9)	7 (25)	160 (17)
\$25-49,999	195 (26)	28 (20)	9 (32)	232 (25)
\$50-74,999	303 (40)	50 (35)	10 (36)	363 (39)
\$75,000 and over	126 (17)	52 (36)	2 (7)	180 (19)
<b>Respondents' age<sup>†</sup></b>				
18-29	45 (6)	14 (10)	5 (19)	64 (7)
30-44	462 (60)	74 (51)	17 (63)	553 (59)
45 and over	258 (34)	56 (39)	5 (19)	319 (34)
<b>Respondents' race/ethnicity</b>				
White	535 (70)	111 (78)	19 (68)	665 (71)
Black	83 (11)	14 (10)	4 (14)	101 (11)
Asian/Pacific Islander	34 (4)	9 (6)	1 (4)	44 (5)
Other	7 (1)	2 (1)	1 (4)	10 (1)
Hispanic	107 (14)	7 (5)	3 (11)	117 (13)

\* Results are weighted to the 2002 US Census Current Population Survey. Percentages are rounded and may not add up to 100.

<sup>†</sup> Statistically significant ( $p < 0.05$ ).

## Beliefs Regarding Trust, Vaccine Laws, and Information Sources

Beliefs regarding trust, vaccine laws, and information sources also differed among parents in different educational settings (Table 4). Slightly more than one half (56%) of the parents surveyed trusted the federal government to set policy for childhood vaccines. This proportion was low among homeschoolers, with only 19% answering yes to the statement, versus 57% for public and 58% for private school parents ( $p < 0.01$ ). A much larger proportion of parents trusted the vaccine advice of their child's health care provider (88%), with homeschool parents again having the lowest proportion that agreed or strongly agreed with the statement (68%, vs 88% for public and 91% for private school parents;  $p < 0.01$ ). Overall, only 17% of parents thought that states should allow parents to take personal

belief exemptions to vaccination. Forty-four percent of homeschool parents, compared to 16% of public and 16% of private school parents, believed personal belief exemptions should be granted ( $p < 0.01$ ). A large proportion of parents (78%) believed they would have their child fully immunized if it were not required by law. Homeschool parents had the lowest proportion of respondents who would fully immunize if it were not required by law (59%), followed by public (77%) and private (86%) school parents ( $p < 0.01$ ). Finally, 63% of parents overall agreed or strongly agreed that they had enough information to make a good decision about immunizing their child. Although no statistically significant difference existed across the 3 groups, it is important to note that homeschool parents had the lowest proportion (56%) who agreed or strongly agreed that they had access to enough immunization information.

Table 3  
**Respondents' Vaccine Safety and Importance Beliefs Stratified by Youngest Child's School Type: HealthStyles, 2003\***

Variable	Public, n (%)	Private, n (%)	Home, n (%)	Total, N (%)
<b>Belief in general safety of childhood immunizations<sup>†</sup></b>				
Not/somewhat safe	206 (27)	37 (26)	13 (48)	256 (27)
Safe/very safe	557 (73)	107 (74)	14 (52)	678 (73)
<b>Confidence in safety of routine childhood immunizations<sup>†</sup></b>				
Not/somewhat confident	194 (26)	28 (20)	14 (50)	236 (26)
Confident/very confident	563 (74)	114 (80)	14 (50)	691 (75)
<b>Concerned that vaccines may cause learning disabilities<sup>†</sup></b>				
No	667 (87)	118 (82)	19 (70)	804 (86)
Yes	98 (13)	26 (18)	8 (30)	132 (14)
<b>Concern that vaccine ingredients are unsafe<sup>†</sup></b>				
No	611 (80)	113 (79)	17 (61)	741 (79)
Yes	154 (20)	31 (22)	11 (39)	196 (21)
<b>General importance of immunizations in keeping kids healthy<sup>†</sup></b>				
Not/somewhat important	99 (13)	18 (13)	13 (46)	130 (14)
Important/very important	664 (87)	126 (88)	15 (54)	805 (86)
<b>Concerned that vaccines are given to prevent nonserious illnesses<sup>†</sup></b>				
No	686 (90)	137 (96)	21 (75)	844 (90)
Yes	79 (10)	6 (4)	7 (25)	92 (10)
<b>Concerned that vaccines are given for diseases kids are unlikely to get<sup>†</sup></b>				
No	668 (87)	132 (92)	21 (75)	821 (88)
Yes	97 (13)	12 (8)	7 (25)	116 (12)
<b>Unvaccinated child may get or transmit diseases such as measles<sup>†</sup></b>				
Disagree	242 (32)	39 (27)	17 (63)	298 (32)
Agree	517 (68)	104 (73)	10 (37)	631 (68)

\* Results are weighted to the 2002 US Census Current Population Survey. Percentages are rounded and may not add up to 100.

<sup>†</sup> Statistically significant ( $p < 0.05$ ).

## DISCUSSION

The distribution of school types in this study is similar to US Department of Education statistics, which in 1999 (the most recent year for which homeschooling estimates are available), estimated that 87% of primary and secondary school children attended public schools, 11% attended private schools, and 2% were homeschooled.<sup>4</sup> Parent demographic characteristics—including age, education, and household income—differed by child's school type in this analysis. Of the 3 school types analyzed, a greater proportion of parents who homeschool had negative attitudes and beliefs regarding vaccines and vaccine safety as well as low trust in health care providers and the government.

Demographic characteristics were associated with a child's school type. A greater proportion of private school parents reported a household income greater than \$50,000 annually. This is not surprising, considering that the costs associated with private school education are the responsibility of parents. Since it is likely that education is correlated with income, it also makes sense that a greater proportion of private school parents reported educational attainment past high school when compared to public or homeschool parents. With 82% having educational attainment beyond high school, homeschool parents reported nearly as high an educational attainment as private school parents. This is similar to the most recent US Department of Education statistics on homeschooling, which reported above-average educational attainment for homeschool parents, along with average income.<sup>14</sup> The fact that their income level was not as high as private school parents is likely due to the fact that in most homeschooling situations, a parent must stay home to teach the children, precluding them from participating in the labor force outside of the home.<sup>14</sup> Data in this survey support this finding as well. Although previous data have shown that homeschooling families are more likely than nonhomeschoolers to be white, the present data did not support such a finding.<sup>14</sup> The small sample size of homeschoolers in this study may have lacked the statistical power to detect a difference among the groups. When data were collapsed in an attempt to increase statistical power, a comparison of whites to all other racial and

ethnic groups still found no significant difference between parents in the 3 school types (data not shown).

Homeschooling parents appeared to have the most concern for vaccine safety as well as the least belief in the importance or necessity of vaccination. There is very little literature regarding the beliefs and practices of parents who homeschool, and a search for the term "homeschool" on both PubMed and Medline did not return any results regarding the health beliefs and practices of these families. One ethnographic study of homeschooling did anecdotally mention homeschooling parents who refused immunization.<sup>15</sup> Further study is needed to confirm our results and explore possible reasons behind them, as well as ways in which the vaccine concerns of homeschooling parents can be addressed in a way that is meaningful and credible. This is especially important given that homeschooling is a growing movement in the United States and is expected to continue to grow in popularity.<sup>16</sup>

While homeschooling is legal in all 50 US states, few states have a mechanism in place to track vaccination rates in homeschools.<sup>17</sup> A follow-up study is planned to address these issues in greater depth and with a larger sample of homeschooling parents.

There was an overall lack of adequate vaccination information among parents in this study. Only 63% agreed or strongly agreed that they had enough information to make a good decision about vaccinating their children. As parental familiarity with vaccine-preventable diseases diminishes, and increased attention and concern is focused on the potential for adverse events following immunization, the provision of information from a trusted and credible source has become more important than ever. In general, parents in this survey reported a great deal of trust in their child's health care provider, a finding that has been reported elsewhere.<sup>18</sup> A lower proportion of homeschool parents, however, reported trust in their

Table 4  
**Respondents' Beliefs Regarding Trust, Information Sources, and Vaccine Laws Stratified by Youngest Child's School Type: HealthStyles, 2003\***

Variable	Public, n (%)	Private, n (%)	Home, n (%)	Total, N (%)
<b>Do you trust the government to set policy for childhood vaccines?<sup>†</sup></b>				
Yes	428 (57)	83 (58)	5 (19)	516 (56)
No	154 (21)	36 (25)	11 (41)	201 (22)
Don't know	170 (23)	24 (17)	11 (41)	205 (22)
<b>Physician has influence in decision to vaccinate child<sup>†</sup></b>				
No	79 (10)	18 (13)	8 (29)	105 (11)
Yes	680 (90)	125 (87)	20 (71)	825 (89)
<b>Nurse has influence in decision to vaccinate child<sup>†</sup></b>				
No	198 (27)	54 (39)	15 (54)	267 (29)
Yes	550 (74)	83 (61)	13 (46)	646 (71)
<b>I trust the vaccine advice my child's health care provider gives me<sup>†</sup></b>				
Strongly agree/disagree/neutral	95 (13)	13 (9)	9 (32)	117 (13)
Agree/strongly agree	667 (88)	130 (91)	19 (68)	816 (88)
<b>I have access to enough information to make good immunization decisions</b>				
Strongly agree/disagree/neutral	277 (37)	51 (36)	12 (44)	340 (37)
Agree/strongly agree	482 (64)	92 (64)	15 (56)	589 (63)
<b>Should states grant immunization exemptions for religious beliefs?<sup>†</sup></b>				
Yes	157 (21)	41 (29)	11 (42)	209 (22)
No	423 (55)	78 (55)	9 (35)	510 (55)
Don't know	183 (24)	24 (17)	6 (23)	213 (23)
<b>Should states grant immunization exemptions for personal beliefs?<sup>†</sup></b>				
Yes	120 (16)	22 (16)	12 (44)	154 (17)
No	468 (62)	96 (68)	9 (33)	573 (62)
Don't know	173 (23)	24 (17)	6 (22)	203 (22)
<b>Would you have child immunized if not required for school/daycare?<sup>†</sup></b>				
Yes	578 (77)	122 (86)	16 (59)	716 (78)
No/don't know	177 (23)	20 (14)	11 (41)	208 (23)

\* Results are weighted to the 2002 US Census Current Population Survey. Percentages are rounded and may not add up to 100.

<sup>†</sup> Statistically significant ( $p < 0.05$ ).

child's health care provider when compared to their public and private school counterparts. Identifying other trusted sources of vaccination information for homeschooling parents and ensuring delivery of adequate immunization information to all parents through their child's health care providers are areas that need further attention, especially as new vaccines are developed and recommended for children and adolescents.

This analysis is subject to several limitations. The small sample size of private school parents and especially of homeschool parents may have failed to detect additional differences between the groups. In addition, the data are cross-sectional, and therefore, causality cannot be determined; namely, whether the school type influenced the beliefs of parents or like-minded parents sent their children to similar schools. However, this limitation does not affect the outcome of interest: whether or not parental beliefs differ by school type among the parents surveyed. The small number of homeschooling parents in the sample also limits the ability to generalize conclusions about this group; therefore, a follow-up study has been planned with a larger sample size. Self-report data are subject to recall bias; however, researchers attempted to minimize this by using the respondents' youngest child as the reference point for answering the questions. Finally, although HealthStyles does not use a probability sampling design, the weighting methods helps to reduce potential nonresponse bias, and comparison with other probability surveys, as outlined previously, has demonstrated high correlation on similar questions.<sup>7</sup>

Although most parents in this survey believed that vaccines are safe and important, a sizable minority of parents reported concerns regarding vaccine safety and usefulness. The level of concern differed depending on the type of school attended by the respondents' youngest child, with a larger proportion of homeschooling parents reporting low confidence in the safety or necessity of vaccines compared to their public or private school counterparts. School health professionals should be aware of these differences in parental beliefs and concerns and recognize the opportunity to partner with educational institutions, including homeschooling organizations, to provide credible, tailored vaccination information. Further study will concentrate on the vaccine knowledge, attitudes, and beliefs of parents who homeschool, as well as the development and evaluation of information for families involved in different educational settings. These are important next steps in increasing trust and reducing concerns related to childhood vaccines. ■

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