

Vaccine Beliefs of Parents Who Oppose Compulsory Vaccination

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SYNOPSIS

Objectives. Our objectives were the following: (1) to describe the socio-demographic factors, vaccine beliefs, and behaviors that are associated with parental opposition to compulsory vaccination, and (2) to determine if the availability of a philosophical exemption in a parent's state of residence is associated with parental opposition to compulsory vaccination.

Methods. Data from the 2002 HealthStyles survey were analyzed. Chi-square analysis was used to identify significant associations between belief and behavior questions and opposition to compulsory vaccination for school entry. Multivariate logistic regression was conducted using significant variables from the bivariate analysis to identify independent predictors of opposition to compulsory vaccination among surveyed parents.

Results. Of respondents with at least one child aged ≤ 18 years living in the household ($n=1,527$), 12% were opposed to compulsory vaccination. Survey results indicate that a parent's belief regarding compulsory vaccination for school entry is significantly associated with beliefs in the safety and utility of vaccines, as well as intention to have the youngest child fully vaccinated. Residence in a state that permits philosophical exemption to vaccination also was significantly associated with a parent's opposition to compulsory vaccination for school entry.

Conclusions. Providing basic information to parents regarding vaccines and vaccine-preventable diseases may help reduce opposition to compulsory vaccination by reinforcing the safety and importance of routine childhood vaccinations.

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Laws requiring children to be vaccinated before school entry have helped the United States achieve high overall vaccination rates. The first laws mandating vaccination of the public for smallpox appeared in Massachusetts in the 19th century, and laws specifically addressing vaccination as a condition of public school attendance soon followed.¹ In the 1970s, the enforcement of school vaccination laws played a key role in greatly reducing the number of measles cases in the U.S.^{2,3} More recently, laws for middle school attendance have helped increase coverage rates for Hepatitis B vaccine among adolescents.^{4,5} School laws have been modified over the years as new vaccines are recommended. Although all 50 states legislate that children must be up-to-date in their required vaccinations before starting school, all states also allow exemptions from this requirement.

The type, details, and enforcement of these exemptions vary.¹ Currently, every state allows exemptions for valid medical contraindications to immunization. In addition, 48 states allow exemptions for religious beliefs that prohibit the use of immunizations. As of the 2004–2005 school year, 19 states allowed for a separate philosophical exemption, in which parents whose personal (apart from religious) beliefs are opposed to vaccination may claim exemption for their child (Personal communication, Dan Salmon, PhD, MPH, Institute for Vaccine Safety, Johns Hopkins Bloomberg School of Public Health, March 2004). The procedures for claiming a philosophical exemption vary among states in their level of complexity; some states require only a parent signature, while others require a notarized form or letter from the parent.⁶ The reasons for philosophical exemption to vaccination are likewise varied. Parents may have a belief in the superiority of other methods of fighting disease, such as alternative treatments or natural immunity, or they may be concerned about the safety of vaccines. A philosophical opposition also may result from parents' perceptions of government interference in the health care of their child. The issue of convenience also has been suggested to play a role in philosophical exemptions, for states with easily obtained philosophical exemptions have been shown to have higher exemption rates.⁶ This has led to the concern that philosophical exemptions may be taken merely for convenience in cases where claiming an exemption is easier than completing the increasingly complex schedule of recommended vaccinations.⁶

Although children who remain unvaccinated are able to avoid the small risk of a serious adverse event following vaccination (e.g., anaphylaxis), potentially serious consequences also are associated with remaining unvaccinated. Children who are exempt from routine vaccination are more likely to contract measles and pertussis than vaccinated children.^{7,8} In addition, several accounts exist that detail outbreaks of vaccine-preventable disease among groups with either religious or philosophical opposition to vaccination.^{9–13} In turn, these individuals may transmit disease to children and adults with valid medical contraindications to immunization (e.g., children who are immunocompromised due to chemotherapy), as well as to those who are too young to be vaccinated or to those whose vaccinations were not effective. Because of the increased risk of disease among unvac-

nated children and the potential for many parents to opt out of school entry vaccination requirements for personal reasons, we sought to identify and explain the parental beliefs of those who oppose compulsory vaccination, using the theoretical constructs of the Health Belief Model.¹⁴ Specifically, this study had two objectives. The first was to describe the sociodemographic factors, vaccine beliefs, and behaviors that are associated with opposition to compulsory vaccination (independent of actual exemption status). The second was to determine if the availability of a philosophical exemption in a parent's state of residence is associated with parental objection to compulsory vaccination.

METHODS

Survey

Data from the 2002 HealthStyles survey was used for analysis. HealthStyles is an annual, mail panel survey of adults in the contiguous United States, as well as the District of Columbia; it is a follow-up supplement to the annual ConsumerStyles survey, conducted by Porter Novelli. Respondents for ConsumerStyles were chosen from a pre-selected panel of 550,000 potential respondents that had agreed to be periodically contacted for participation in mail surveys. Ten thousand ConsumerStyles surveys were mailed to a stratified random sample of adult panel members from May through June of 2002. Of these 10,000 panel members, 6,065 returned a survey, for a response rate of 61%. ConsumerStyles participants that returned a survey were recontacted in July and August of 2002 to answer the HealthStyles survey, which contained questions specific to health issues. Thirty-eight ConsumerStyles respondents were lost to follow-up; therefore, 6,027 HealthStyles surveys were sent. The survey data were weighted to the 2000 U.S. Census Current Population Survey on five demographic variables (gender, age, income, race/ethnicity, and household size), creating a nationally representative sample that accounts for nonresponse bias among participants. An assessment of the validity of the panel survey method used to identify respondents for the HealthStyles survey has shown a high correlation with answers to similar questions administered via surveys that use probability sampling, such as the Behavioral Risk Factor Surveillance System.¹⁵ HealthStyles data have been used previously in several areas of health research to analyze the knowledge, attitudes, and behaviors of the U.S. population.^{16–21} For this analysis, only parents with children aged ≤18 years living in the household were included.

Outcome variable

The outcome variable used in the analysis was a survey question that asked about level of agreement (on a five-point Likert scale) with allowing children to go to public school even if they are not vaccinated. Parents who strongly agreed or agreed that children should be allowed to go to public school even if they are not vaccinated were categorized as opposed to compulsory vaccination (*opposed parents*). Parents who were neutral, disagreed, or strongly disagreed with the statement were considered supportive of compulsory vaccination (*supportive parents*).

Sociodemographic characteristics and attitude, belief, and behavior variables

Sociodemographic characteristics and parental attitude, belief, and behavior variables were used to predict the outcome variable. Because of the small sample size of opposed parents, attitude and belief variables with more than two response categories were dichotomized, either from five-point or 11-point scales. Five-point scales were combined into “strongly disagree/disagree/neutral” vs. “agree/strongly agree.” Eleven-point scales were collapsed into 0–7 vs. 8–10, in order to compare parents with an extreme positive attitude toward vaccines (8–10) to those with a neutral or negative attitude toward vaccines (0–7). Behavior was assessed through a question on the parents’ self-reported intention to vaccinate their youngest child. This question was also dichotomized into “my child has/will receive all vaccines” vs. “my child will receive some/no vaccines.” For the geographic analysis, states were classified into two groups based on the availability of a philosophical exemption to vaccination requirements at school entry, as defined by the written vaccination laws of each state at the time of analysis. States that allowed a de facto philosophical exemption (allowing philosophical exemptions under a law that was written as a religious exemption) and states that allowed philosophical exemptions for daycare but not school entry were not included among states with a philosophical exemption. At the time the analysis was conducted, 19 states allowed a formal philosophical exemption to school entry vaccination requirements.

Statistical analyses

We analyzed the frequencies of each response to sociodemographic as well as attitude, belief, and behavior questions collected in the survey. We performed chi-square tests to detect significant associations between variables. Demographic, belief, and behavior variables that were significantly ($p < 0.05$) associated with the outcome variable in the bivariate analysis then were placed in a logistic regression model. The logistic model used the enter method to calculate adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for each predictor of opposition to compulsory vaccination. All statistical analyses were conducted using SPSS, Version 12.0.²²

RESULTS

Response rate and demographic characteristics of respondents

The response rate for the HealthStyles survey was 73% ($n=4,397$), and the weighted subsample of parents of children aged ≤ 18 years was 1,540. Thirteen parents were unable to be classified as either opposed or supportive due to missing data, making the final weighted subsample 1,527. Twelve percent of this weighted subsample was classified as opposed to compulsory vaccinations for school entry ($n=188$).

Table 1 shows selected sociodemographic characteristics of participants stratified by their status regarding compulsory vaccination (opposed or supportive). Opposed parents were significantly different from supportive parents in terms of race/ethnicity, household income, and household size ($p < 0.05$). Supportive parents were more likely to be white, to have a higher household income, and to have a smaller

Table 1. Sociodemographic characteristics of parents who support and oppose compulsory vaccination, HealthStyles 2002 ($n=1,527$)

Variable	Support compulsory vaccination n (Percent)	Oppose compulsory vaccination n (Percent)	Significance level ^a p-value
Gender of respondent			0.259
Female	848 (63)	127 (68)	
Male	491 (37)	61 (32)	
Race of respondent			0.009
White	890 (67)	103 (55)	
African American	175 (13)	36 (19)	
Hispanic	199 (15)	32 (17)	
Other	75 (6)	17 (9)	
Age of respondent			0.647
18–29	160 (12)	21 (11)	
30–39	465 (35)	59 (31)	
40–49	540 (40)	85 (45)	
≥ 50	174 (13)	23 (12)	
Household income			0.004
\$0–24,999	267 (20)	58 (31)	
\$25,000–49,999	359 (27)	51 (27)	
\$50,000–74,999	309 (23)	36 (19)	
$\geq \$75,000$	405 (30)	43 (23)	
Education of respondent			0.087
Less than high school	79 (6)	9 (5)	
High school graduate	309 (24)	38 (21)	
Some college	496 (38)	88 (49)	
College graduate	270 (21)	30 (17)	
Graduate school	149 (11)	15 (8)	
Household size			0.004
1–4	977 (73)	118 (63)	
≥ 5	362 (27)	70 (37)	
State of residence ^b			<0.001
Philosophical exemption available	643 (48)	114 (61)	
No philosophical exemption available	696 (52)	74 (39)	

NOTES: Data were weighted to reflect the 2000 U.S. Census Current Population Survey. Percentages and numbers have been rounded.

^aStatistically significant ($p < 0.05$) variables were included in logistic regression model.

^bIncludes the District of Columbia; does not include Alaska or Hawaii

household size than opposed parents. Likewise, a significant difference was found in the availability of a philosophical vaccine exemption between opposed and supportive parents: opposed parents were more likely to live in a state that offers philosophical exemptions. Gender, education, and age of respondents were similar for both groups.

Vaccine beliefs and self-reported intention to vaccinate youngest child

Table 2 shows the self-reported vaccine utility and safety beliefs of parents. Regarding vaccine utility, a greater

Table 2. Beliefs and behaviors of parents who support and oppose compulsory vaccination, HealthStyles 2002 (n=1,527)

Variable	Support compulsory vaccination n (Percent)	Oppose compulsory vaccination n (Percent)	Significance level ^a p-value
The body can protect itself from vaccine-preventable diseases			<0.001
Strongly disagree/disagree/neutral	1,194 (90)	142 (76)	
Agree/strongly agree	135 (10)	45 (24)	
Importance of vaccines to children's health			<0.001
Not/somewhat important	232 (17)	68 (36)	
Important/very important	1,099 (83)	119 (64)	
Vaccines are necessary to prevent certain diseases			<0.001
Strongly disagree/disagree/neutral	183 (14)	57 (30)	
Agree/strongly agree	1,152 (86)	131 (70)	
Concerned that vaccines are given to prevent diseases that are not serious			<0.001
No	1,262 (94)	154 (82)	
Yes	77 (6)	34 (18)	
Concerned that vaccines are given to prevent diseases that children are unlikely to get			<0.001
No	1,216 (91)	146 (78)	
Yes	123 (9)	42 (22)	
General safety of vaccines for children			<0.001
Unsafe/somewhat safe	426 (32)	87 (47)	
Safe/very safe	907 (68)	100 (54)	
Confidence in the safety of routine childhood vaccines			<0.001
Very confident/confident	1,115 (85)	130 (72)	
Somewhat/not confident	196 (15)	50 (28)	
Concerned that children get too many vaccines in the first two years of life			<0.001
No	1,170 (87)	133 (71)	
Yes	169 (13)	55 (29)	
Plan for immunizing youngest child			<0.001
Has/will receive all vaccines	1,260 (99)	157 (90)	
Will receive some or no vaccines	14 (1)	18 (10)	
Children get more vaccines than are good for them			0.083
Strongly disagree/disagree/neutral	858 (65)	110 (59)	
Agree/strongly agree	462 (35)	78 (42)	

NOTES: Data were weighted to reflect the 2000 U.S. Census Current Population Survey. Percentages and numbers have been rounded.

^aStatistically significant ($p < 0.05$) variables were included in logistic regression model.

proportion of opposed parents were likely to agree that (1) the body can protect itself without vaccines (24% vs. 10% of supportive parents; $p < 0.001$) and (2) vaccines are not or only somewhat important to a child's health (36% vs. 17% of supportive parents; $p < 0.001$). Similarly, a greater proportion of opposed parents disagreed that vaccines are necessary to prevent certain diseases (30% vs. 14% of supportive parents; $p < 0.001$). Opposed parents also were more likely than supportive parents to be concerned that vaccines are given to prevent diseases that are not serious (18% vs. 6%; $p < 0.001$), as well as diseases that children are not likely to get (22% vs. 9%; $p < 0.001$). A similar trend was observed

regarding the safety beliefs of parents. A greater proportion of opposed vs. supportive parents were likely to (1) believe that vaccines were unsafe or only somewhat safe (47% vs. 32%; $p < 0.001$), (2) be not or only somewhat confident in the safety of childhood vaccines (28% vs. 15%; $p < 0.001$), and (3) report concern that children get too many vaccines in their first two years of life (29% vs. 13%; $p < 0.001$). In addition, opposed vs. supportive parents were significantly more likely to report that their child would receive none or only some of the recommended childhood vaccines (10% vs. 1%; $p < 0.001$).

Logistic regression analysis

Results of the logistic regression analysis are shown in Table 3. Income was the only sociodemographic variable that remained significant in the final logistic regression model. Respondents who were opposed to compulsory vaccination were more likely to be from the lowest income category surveyed (adjusted OR=2.3; 95% CI 1.3, 4.0). Also from this analysis, opposed parents were shown to be more likely to (1) agree that the body can protect itself from vaccine-preventable diseases without vaccines (OR=2.3; 95% CI 1.4, 3.6) and (2) disagree that vaccines are necessary to prevent certain diseases (OR=1.7; 95% CI 1.1, 2.7). In addition, opposed parents were more likely to believe that vaccines are not or only somewhat important to children's health (OR=1.8; 95% CI 1.0, 3.1) and to indicate that they did not plan to have their youngest child receive all recommended vaccines (OR=4.3; 95% CI 1.8, 10.3). Finally, parents opposed to compulsory vaccination were more likely to live in a state where philosophical exemption to vaccination was available (OR=1.7; 95% CI 1.2, 2.4).

DISCUSSION

This study shows that a parent's opposition to compulsory vaccination is associated with negative attitudes and beliefs about the safety and utility of vaccines. This alone is not remarkable; however, what is notable is that parents' lack of intention to have their youngest child fully vaccinated was an independent predictor of opposition. Household income also was a predictor of parental opposition to compulsory

vaccination, as was residence in a state that permits philosophical exemption to vaccination.

A perception of vaccines as being of low importance to a child's health (or, conversely, the belief that the body can protect itself without vaccines) was a key finding of this analysis. The Health Belief Model is a theory that attempts to explain health-seeking behavior by examining how people perceive disease severity, their likelihood of contracting that disease, the benefits of taking preventive action, and the costs of taking preventive action.¹⁴ This theoretical framework is useful in helping to explain these findings. If parents do not perceive vaccine-preventable diseases as severe enough to warrant preventive action or if they do not perceive any particular benefit to their child's health from vaccination, then they will be more likely to oppose any law or policy that mandates such behavior. Because many parents lack firsthand knowledge of vaccine-preventable diseases such as measles or polio, they are not likely to perceive such illnesses to be an immediate threat to the health of their children. This is similar to the findings of previous research. When asked about their child's susceptibility to several vaccine-preventable diseases, parents in a nationally representative survey indicated a low level of perceived susceptibility (a mean ranging from 5.9 to 6.8 on a 10-point scale) for five out of six diseases.²³ Parents also may oppose compulsory vaccination on the grounds that natural immunity is preferable to vaccine-induced immunity. A preference for disease-induced immunity has been suggested as one reason for vaccine refusal among parents.²⁴ Educating parents about vaccine-preventable diseases, as well as the vaccines themselves, may

Table 3. Results of logistic regression analysis of parents who oppose compulsory vaccination, HealthStyles 2002

Variable	Adjusted odds ratio	95% confidence interval
Household income		
\$0–24,999	2.3	1.3, 4.0
\$25,000–49,999	1.3	0.8, 2.2
\$50,000–74,999	1.0	0.6, 1.7
≥\$75,000	Reference	Reference
State of residence ^a		
Philosophical exemption available	1.7	1.2, 2.4
No philosophical exemption available	Reference	Reference
Vaccines are necessary to prevent certain diseases		
Strongly disagree/disagree/neutral	1.7	1.1, 2.7
Agree/strongly agree	Reference	Reference
The body can protect itself from vaccine-preventable diseases		
Strongly disagree/disagree/neutral	Reference	Reference
Agree/strongly agree	2.3	1.4, 3.6
Importance of vaccines to children's health		
Not/somewhat important	1.8	1.0, 3.1
Important/very important	Reference	Reference
Plan for immunizing youngest child		
Has/will receive all vaccines	Reference	Reference
Will receive some or no vaccines	4.3	1.8, 10.3

NOTE: Data were weighted to reflect the 2000 Current Population Survey.

^aIncludes District of Columbia; does not include Alaska or Hawaii

be one way to impart the importance of vaccines to the health of their child.

Although we were unable to assess the vaccination status of respondents' children, the fact that intention to forego some or all recommended vaccination was associated with opposition to compulsory vaccination is notable. Prior research on the link between negative vaccination beliefs and intention to forego vaccination supports this result. One study set in the town of Ashland, Oregon, found that parents who reported concerns about the safety and necessity of childhood immunizations or who were not convinced of the efficacy of vaccines were more likely to consider claiming an exemption from vaccination for their children.²⁵ Similarly, a recent study found that nearly 15% of underimmunization in the U.S. could be attributed to parental attitudes, beliefs, and behaviors.²⁶

Results of our survey also showed that parents who reported lower household income were more likely to be opposed to compulsory vaccination than parents reporting higher household income. Family income has previously been associated with immunization coverage levels, and low family income is also a risk factor for underimmunization.²⁷⁻²⁹ Parents with lower household incomes are more likely to experience barriers, such as transportation or access to health care services, that make staying up-to-date on immunizations difficult.²⁷ The low-income parents in this study who opposed compulsory vaccination may have done so because of similar barriers.

Residence in a state that offers philosophical exemption to vaccination also was significantly associated with opposition to mandatory vaccination. However, our study was unable to assess causality (i.e., if parents opposed to compulsory vaccination advocated for a philosophical exemption law to be passed in their state, or if a political climate that, among other things, included such laws helped shape the beliefs of these parents). Our analysis considered parents eligible for a philosophical exemption only when an official state law allowing such exemptions was present; however, religious exemptions have often been used as de facto philosophical exemptions, especially in states where the religious exemption law is broadly constructed.⁶ The strict definition of philosophical exemption used in this study may have underestimated the difference that exists in practice, where philosophical exemptions may often be granted under the category of religious beliefs. Although we were unable to determine the philosophical exemption status of parents in this survey, the association between availability of a philosophical exemption and an increased likelihood of opposition to compulsory vaccination suggests the potential for high rates of exemption among opposed parents. Further study is needed to determine the extent to which opposition to compulsory vaccination actually leads parents to seek exemption.

Several limitations are found in the interpretation of these study results. The small sample size of parents opposed to compulsory vaccination may have failed to detect significant differences between groups, and it prevented us from conducting an in-depth analysis at the state level, where differences in behavior and opinion may be affected by the local culture and political climate in each state. In addition,

we cannot assume exemptor status or intention to exempt based on a parent's theoretical opposition to a mandatory vaccination requirement for public school attendance. However, as demonstrated by the survey of parents in Ashland, concerns about vaccine safety and utility have been associated with exemption-seeking behavior, and in our study, parents opposed to compulsory vaccination were more likely to report an intention to forgo some or all recommended vaccines for their youngest child.²⁵ This suggests that if these parents intend to have their children attend public school, then some type of exemption may be necessary if they do not fully immunize their children. Because this was a self-report survey, recall bias may have occurred, for we were unable to verify the immunization status of the children of survey respondents. Self-reported intention to vaccinate, therefore, was used as an indicator of the immunization behavior of respondents. Finally, probability sampling was not used to collect data, and although the survey data were weighted to account for nonresponse bias and to reflect the general U.S. population, nonresponse, nevertheless, may have biased the results.

Opposition to compulsory vaccination is not a new phenomenon; it has been present in some form since the time of the earliest compulsory vaccination laws.³⁰ However, this issue can only become more complex as vaccine-preventable diseases, which formerly created a visible reinforcement of the importance of immunization, have become increasingly rare. We found that parents who claim an opposition to compulsory vaccination are more likely to believe that vaccines are unimportant to their child's health and that their children can fight off illness without the help of vaccines. These parents also are more likely to report that they don't intend for their children to receive all recommended vaccines. As vaccination schedules increase in complexity and as a growing number of states allow exemptions, effective risk communication between providers and parents, as well as provision of basic vaccine information to parents regarding (1) the diseases vaccines prevent, (2) what could happen if their children are not vaccinated, (3) how vaccines work, and (4) the concept of herd immunity, are important first steps in building a better understanding of the importance of routine childhood vaccinations.

We are grateful to Dan Salmon, PhD, MPH, for his thoughtful comments on the research proposal, and Bob Chen, MD, for helpful feedback on the manuscript draft.

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