

By Sarah E. Gollust, Amanda F. Dempsey, Paula M. Lantz, Peter A. Ubel, and Erika Franklin Fowler

Controversy Undermines Support For State Mandates On The Human Papillomavirus Vaccine

ABSTRACT State actions requiring adolescent girls to receive the human papillomavirus (HPV) vaccine created controversy following the vaccine's approval in 2006. Some health professionals worried that the controversy might dampen public support for those state policies and for other school immunizations in general. We fielded an experimental Internet survey to determine how controversy affects attitudes about vaccines. We discovered that public support for the HPV vaccine mandates wanes when the public is informed that the policies are controversial. However, the experimental survey also revealed that exposure to this policy controversy did not spill over and reduce public support for immunizations in general.

In June 2006, the US Food and Drug Administration (FDA) approved Gardasil, the first vaccine to protect against four strains of human papillomavirus (HPV) that can cause cervical and genital cancers as well as genital warts. Three months later, Michigan introduced legislation to require the vaccine for girls entering the sixth grade. Since then, twenty-three states and the District of Columbia have considered similar proposals. Of those, two—the District and Virginia—passed legislation requiring HPV vaccination as a prerequisite to entering middle school.¹

Medical professionals, public health experts, politicians, and parents disagreed about the merits of legislative mandates concerning the HPV vaccine.^{2,3} Although many in the medical community supported the vaccine for its protective potential, other groups and parents criticized the mandates. Some opposed immunizing pre-teen girls against a sexually transmitted disease or believed that the vaccine would encourage sexual promiscuity. Others objected because the vaccine was new, was relatively untested, and might have had undiscovered side effects. The resulting controversy was widely reported in the mass media.

Background On The Issue

Previous research analyzing newspaper coverage of the HPV vaccine in the United States found that the overall tone of articles tended to be slightly more negative about the vaccine than positive.⁴ Researchers also found that the vaccine was increasingly described as controversial over the course of the debate. This was particularly so after states began to consider requiring the vaccine for school-age girls.⁵

POLITICIZED DEBATE There is concern among public health and medical professionals about the consequences of the politicized debate that erupted in the rush to draft legislation imposing the HPV vaccine mandates. Furthermore, commentators speculate that the controversy may have undermined public confidence in the HPV vaccine and, more generally, in other state immunization requirements.⁶⁻⁸

For instance, in a May 2007 editorial in the *Journal of the American Medical Association*, Lawrence Gostin and Catherine DeAngelis argued that "making the HPV vaccine mandatory contributes to long-standing parental concerns about the safety of school-based vaccinations. The use of compulsion, therefore, could have the unintended consequence of heightening

DOI: 10.1377/hlthaff.2010.0174
HEALTH AFFAIRS 29,
NO. 11 (2010): 2041-2046
©2010 Project HOPE—
The People-to-People Health
Foundation, Inc.

Sarah E. Gollust (sgollust@umn.edu) is an assistant professor in the Division of Health Policy and Management, University of Minnesota, in Minneapolis.

Amanda F. Dempsey is an assistant professor in the Division of General Pediatrics, University of Michigan, in Ann Arbor.

Paula M. Lantz is the SJ Axelrod Collegiate Professor and Chair of Health Management and Policy at the School of Public Health, University of Michigan.

Peter A. Ubel is the John O. Blackburn Professor of Marketing at the Fuqua School of Business, Duke University, in Durham, North Carolina.

Erika Franklin Fowler is an assistant professor of government at Wesleyan University, in Middletown, Connecticut.

parental and public apprehensions about childhood vaccinations.^{76(p1922)} Other social science research suggests that media reports of controversy about policy issues lead to declining public trust in and increased cynicism toward government.^{9,10}

SPILLOVER EFFECT Evidence of a “spillover effect”—a general decline in support for vaccines or vaccine requirements in response to information about a vaccine controversy in the media—could well be serious. Such erosion could cause more parents to refuse to have their children vaccinated against various diseases and lead to increases in outbreaks of infectious diseases among children.¹¹ For example, as of September 14, 2010, more than 4,000 cases of pertussis (whooping cough) had been reported in California—the highest number of cases reported in fifty-five years.¹² Children who were under- or unvaccinated, usually because their parents refused permission, were particularly vulnerable to pertussis infection.¹³

Parental vaccine refusals tend to cluster geographically, probably in part because of the influence of local media and the stances local health care providers and politicians take toward vaccines.¹¹ Over the past decade, several prominent disease outbreaks resulting from parental vaccine refusal have been documented. Such outbreaks result in huge costs to the public health and health care systems. For instance, a 2008 measles outbreak in San Diego, California, attributed to intentionally unvaccinated children, cost \$176,980 in investigation, containment strategies, and direct medical expenses.¹⁴

EXAMINING THE INFORMATION STRATEGY Recent studies have evaluated the effects of various HPV vaccine information strategies on public attitudes, intentions, and risk perception.¹⁵⁻¹⁷ However, no researchers have examined the direct effect that media coverage of the controversy surrounding mandated HPV vaccination for school-age girls may have had on public support for state HPV vaccination requirements. Nor have researchers examined the spillover effect of the controversy on public confidence in immunizations more generally. To fill this gap, we surveyed a nationally representative sample of Americans.

High-profile medical issues are often controversial, and journalistic practices can dramatize the level of the controversy.^{10,18,19} This research therefore has implications for how public attitudes and behavior might be shaped—even unintentionally—by the mass media’s presentation of conflict.

Study Data And Methods

SAMPLE Study participants were randomly selected by Knowledge Networks, a survey firm that maintains a panel of eligible respondents. The panel is designed to be representative of the US population. Panel members are recruited via probability sampling (random-digit dialing), and their households are provided with Internet access and computer hardware if necessary.

Previous studies using the Knowledge Networks panel have been published in peer-reviewed health journals.²⁰⁻²² Research demonstrates the quality and validity of this mode of data collection.²³ Because survey respondents were unaware of our study’s subject before they agreed to participate, their participation in the panel was unlikely to bias the results.²⁴

Participants completed the Internet-based survey between June 19 and July 2, 2009. During this time, the HPV vaccine was not a common topic of news coverage. Searches of the online LexisNexis and Newsbank databases of 100 newspapers across fifty states, national television nightly news broadcasts, and the Associated Press wire service identified only seventeen articles or news stories about the vaccine between June 1 and July 2. The study protocol was reviewed by the Institutional Review Board of the University of Michigan and was declared exempt from human subjects review because no identifying information would be collected.

Of the 1,116 Knowledge Networks panel members invited, 598 (53.6 percent) agreed to participate in the study. Although this response rate was modest, the weighted analysis adjusted for observed demographic differences in response. Exhibit 1 presents (weighted) descriptive statistics for the full sample and by experimental group, described below.

STUDY DESIGN Participants in the online survey were randomly assigned to one of two groups and exposed to slightly different hypothetical news briefs about legislative action concerning the HPV vaccine.²⁵ The news briefs were identical except for whether controversy was present in the headline and concluding sentences. The “uniform support” news brief stated that politicians and medical experts were in support of the legislation. The “controversy” version presented medical and political conflict surrounding proposed HPV vaccine legislation.

After reading the news briefs, participants answered a series of questions about their vaccine-related attitudes. Given the experimental design, any differences in participants’ responses can be inferred to result from the random, varying exposure to the “treatment,” which in this case was information indicating that HPV vaccine policies are controversial.

EXHIBIT 1

Study Participants' Characteristics, By Experimental Group, 2009

Characteristic	Full sample (N = 598)	Uniform-support group (n = 297)	Controversy group (n = 301)	p value of difference between groups
AGE AND SEX				
Mean age, years	47.2	47.9	46.5	0.46
Female	51.7%	52.3%	51.2%	0.83
EDUCATIONAL ATTAINMENT				
Less than high school	13.8%	13.4%	14.2%	0.99
High school	31.2%	31.0%	31.4%	
Some college	28.1%	28.0%	28.3%	
Bachelor's degree or higher	26.9%	27.6%	26.1%	
PARENTAL STATUS				
Parent of a child under 18	31.4%	31.6%	31.2%	0.95
RACE/ETHNICITY				
White, non-Hispanic	69.1%	70.3%	68.1%	0.97
Black, non-Hispanic	11.6%	11.7%	11.5%	
Other, non-Hispanic	5.5%	5.5%	5.4%	
Multiracial, non-Hispanic	1.1%	1.1%	1.1%	
Hispanic	12.7%	11.5%	13.8%	
AWARENESS OF VIRUS OR VACCINE				
Previously aware of HPV or vaccine that prevents cervical cancer	75.6%	79.6%	71.8%	0.08

SOURCE Authors' analyses of study data. **NOTES** "Uniform-support" group was exposed to a hypothetical news story that did not describe controversy about support of human papillomavirus (HPV) vaccine. "Controversy" group was exposed to a hypothetical news story describing disagreement among experts on this vaccine. Differences between groups were tested with Pearson chi-square tests (for all categorical variables) or linear regression (for age). Percentages might not total 100 because of rounding.

MEASURES

► **DEPENDENT VARIABLES:** We measured support for HPV vaccine requirements for school attendance using questions adapted from the National Poll on Children's Health:²⁶ "Do you support, oppose, or neither support nor oppose a state law that requires girls to get the HPV vaccine (that prevents cervical cancer) before entering 9th grade? [If support or oppose]: Do you (support/oppose) that a great deal, moderately, or a little?" A seven-item scale was created from this variable, ranging from strong opposition to strong support, which we rescaled to run from 0 to 1. We also calculated a dichotomous measure of policy support, conveying support for the policy versus either opposition or neutrality toward it.

Measures of support for vaccines came from five items adapted from previous research on immunization attitudes.²¹ Respondents stated their level of agreement, ranging from 1 ("strongly disagree") to 5 ("strongly agree"), with the following statements: "Required childhood vaccinations are important for protecting the American public from disease"; "Government should have the authority to require vaccines"; "Vaccines protect children's health"; "Vaccines protect adults' health"; and "Vaccines are safe." These five statements

formed a reliable index (Cronbach's alpha = 0.865), created by taking the mean across the items and rescaling it to run from 0 to 1.

► **OTHER VARIABLES:** We measured respondents' prior awareness of the HPV vaccine with two questions that preceded the news brief on the survey: Had the respondent ever heard of HPV, or of a vaccine that prevents cervical cancer? After reading the news brief, eligible respondents—those with daughters ages 11–17 at home or female respondents up to age 26—were asked if they or their daughters had received at least one dose of the HPV vaccine and, if not, how likely they or their daughters were to receive it. Responses were on a scale of 1 ("very unlikely") to 5 ("very likely").

ANALYSIS We compared the differences in support for requiring the HPV vaccine and support for immunization in general between the two experimental groups, using chi-square tests and linear and logistic regression analyses. By estimating regression models fitted with interaction terms, we also examined differences in the impact on relevant subgroups of exposure to the media report mentioning controversy. These subgroups included people with and without daughters under eighteen; people previously aware of the HPV vaccine; and people unaware of it. All analyses used the survey weights provided

by Knowledge Networks to adjust for non-response and to produce nationally representative estimates based on data from the Current Population Survey, a nationally representative survey of the US population. We used the statistical software Stata, version 10.1.

Study Results

MIXED SUPPORT FOR MANDATORY VACCINATION

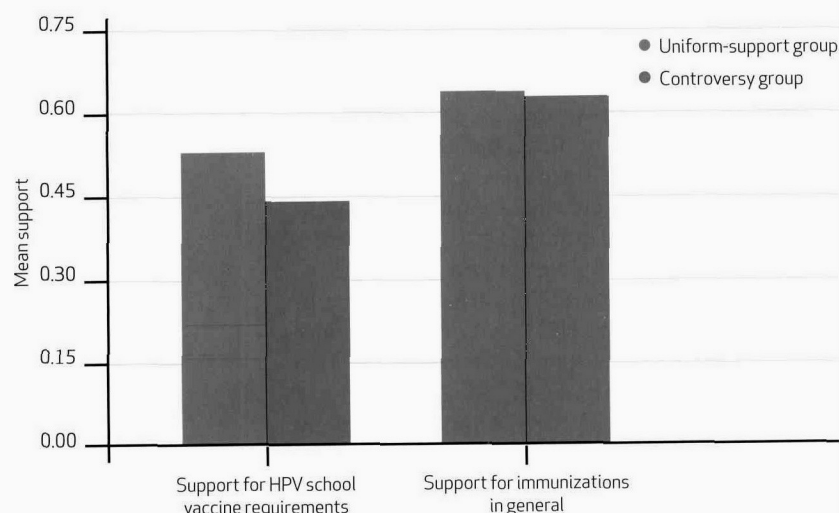
For the full sample of 598 panel respondents, support was mixed for requiring HPV vaccination for school attendance. More than one-quarter (28.2 percent) were strongly or moderately opposed to such a policy. A similar proportion (30.2 percent) were strongly or moderately supportive. Respondents expressed moderate support for immunizations in general, with mean support (0.63) above the midpoint.

Support of mandatory HPV vaccination differed depending on which version of the news brief respondents viewed. Those exposed to the message describing HPV vaccine policy as controversial were significantly less likely (odds ratio: 0.50; 95 percent confidence interval: 0.3–10.79; $p = 0.003$) to support the requirement (22.8 percent) than those given the uniform-support message (37.3 percent).

Exhibit 2 shows the significant mean differences in support for requiring HPV vaccination for school attendance between the two groups.

EXHIBIT 2

How Exposure To Controversy Affects Support For HPV Vaccine School Requirements And General Support For Immunizations



SOURCE Authors' analyses of study data. **NOTES** Difference in support for human papillomavirus (HPV) vaccine school requirements between two groups, one exposed to a hypothetical news story that did not express disagreement among experts and another exposed to a hypothetical news story that did express such disagreement, was statistically significant $p = 0.01$ for support for HPV vaccine school requirements, but not for support for immunizations in general.

However, Exhibit 2 indicates that there were no differences between the groups with regard to their support of the general value of immunizations. These results did not change when we accounted for respondents' previous awareness of HPV vaccine by including this as a variable in regression models.

Even among respondents with higher-than-median support for immunizations in general ($n = 288$), those exposed to the message describing controversy were still significantly less likely to support requiring HPV vaccination than those exposed to the uniform message (OR: 0.44; 95 percent CI: 0.23–0.61; $p = 0.009$). In other words, even after respondents' general attitudes toward vaccines were adjusted for, exposure to the controversy message was associated with lower support for a required HPV vaccine ($\beta = -0.08$, $t = -2.65$, $p = 0.008$).

EFFECT OF CONTROVERSY MESSAGE ON PERSONAL INTENTIONS In addition to general opinions about policy and immunizations, a more personal outcome of interest is whether respondents intended to receive the HPV vaccine themselves or have their daughters receive it. Of the fifty respondents who either had teenage daughters who had not already received at least one dose of the vaccine or were themselves women up to age twenty-six who had not had at least one dose, 19.6 percent in the uniform-message group stated they were likely or highly likely to get the vaccine—or have their daughters get it—in the future. The comparable rate for the group exposed to the controversy message, 14.6 percent, was not significantly different ($p = 0.72$). Because of the small sample size of eligible respondents, we were unable to detect statistically significant effects of the treatment on HPV vaccine intentions.

EFFECT OF CONTROVERSY MESSAGE ON SUBGROUPS Finally, we observed no differences in the effect of the experimental manipulation on relevant subgroups. The effect of exposure to the controversy message was not significantly different between parents—defined as respondents with daughters age eighteen or younger—and nonparents, or between those previously aware or unaware of HPV (for all interactions, $p > 0.35$).

Discussion

In the first examination of its type, we found that exposure to policy controversy in a hypothetical news report was associated with lower public support for required HPV vaccination, compared to public support among those exposed to a news report depicting medical and political support for such a policy.

The significantly lower support for mandatory HPV vaccination emerged despite a very subtle difference in message. The experimental manipulation—the hypothetical news reports—mentioned only the existence of controversy and opposition without identifying any reasons why groups might oppose the required vaccine.

Critics opposed the vaccine because of moral concerns about promiscuity among young girls, fears about potential side effects, and worries that legislation or policies were unduly influenced by the vaccine maker, which was naturally interested in increasing sales.²⁷ This “controversy frame” is important because journalists routinely seek to portray issues as controversial and strive to make reports seem balanced by describing opposing viewpoints.^{18,19}

WHAT ERODES PUBLIC SUPPORT Our strong finding—that even one exposure to controversy had an effect on public opinion about a specific policy—suggests that repetition of controversy in the media over time has the potential to erode public support for a particular policy. In fact, over the course of the health care reform debates of 2009–10, the news media frequently highlighted controversy and the existence of opposition among expert critics, politicians, and the public alike. Consistent with previous research on public attitudes toward health care reform in the 1990s,¹⁰ the public became increasingly negative about the personal impact of reform during the prolonged divisive debate.²⁸

Policy makers and health professionals working with journalists should seek ways to minimize, not exacerbate, the media focus on controversy. Possible approaches include emphasizing scientific agreement where it exists, describing moderate (rather than polarized) viewpoints, and focusing on other aspects of health policy topics that journalists consider newsworthy, such as a policy’s local impact.^{29,30}

NO SPILLOVER TO OTHER VACCINES In spite of the strong effect of controversy framing on public opinion about policies specific to the HPV vaccine, we found no evidence that a single exposure to controversy diminished public belief in the importance, safety, or efficacy of immunizations in general. In other words, the effects of controversy on public opinion in one health domain do not necessarily spill over onto opinions about other, related issues.

The lack of spillover that we found might be because the HPV vaccine case differs from other childhood vaccinations in ways that the public finds salient. For instance, at the time of our survey, the Food and Drug Administration had approved the vaccine only for use with girls, and

so any school requirements being considered were gender specific. Furthermore, the requirement dealt with girls in middle school, whereas most vaccine-related school mandates are aimed at kindergarteners. Finally, the sexually transmitted nature of HPV garnered a great deal of media attention,³¹ differentiating it from diseases such as measles or pertussis that can be transmitted by casual contact in the classroom.

Nonetheless, these findings should be somewhat heartening to those concerned about the unintended consequences of vaccine-specific controversies on public confidence in vaccines in general—an increasingly important topic, given recent outbreaks of diseases that are preventable by vaccination.^{13,14}

QUESTIONS FOR FUTURE RESEARCH This research offers evidence that one common way of framing policy issues in the media—emphasizing controversy—can influence public opinion. However, the study also raises important questions for future research.

First, it evaluated only very short-term effects. It is difficult to extrapolate the results of a single exposure to a news brief to the effects of hearing about controversy through more naturalistic settings, such as across multiple news sources and personal interactions over time. Exposure to controversy over a longer period of time may have even more corrosive effects. Future research using longitudinal designs to explore the volume and content of media messages over time would contribute much to our understanding of how the mass media’s presentation of controversy shapes public opinion.

Second, although the key effect in our study was the presence or absence of controversy, we could not distinguish the effects of controversy per se from the effects of the presence of opposition among politicians or physicians. The manipulation in this study described both types of opposition at once, to avoid triggering respondents’ beliefs that one type of opposition or support may be more legitimate or credible than the other, and thus potentially more persuasive.

However, analysis of news media coverage of the HPV vaccination mandates indicates that news articles frequently described doctors, medical societies, politicians, parents, and advocacy groups as conflicted over mandatory vaccination.⁵ Important questions for future research are which type of conflict has a greater effect on public opinion about health policy, and whether certain groups are more susceptible than others to portrayals of certain types of conflict. ■

A previous version of this study (using a slightly different sample and design) was presented at the Association for Public Policy Analysis and Management's annual meeting, November 5, 2009, in Washington, D.C. The data for this study were collected by Time-Sharing Experiments for the Social Sciences, supported by National Science Foundation Grant no. 0818839, with

Jeremy Freese and Penny Visser, principal investigators. The authors acknowledge the Robert Wood Johnson Foundation Health and Society Scholars program and the Robert Wood Johnson Foundation Scholars in Health Policy Research program for their financial support of this research. Amanda Dempsey serves on the advisory board for Merck. The authors thank Ted

Brader, Skip Lupia, Matt Davis, and Hans Noel for helpful comments on the study design. They thank Kimberly Gross for helpful comments on an earlier version of the manuscript. They also thank Jeremy Freese and Penny Visser, as well as Poom Nukulij of Knowledge Networks, for data support and assistance.

NOTES

- 1 National Conference of State Legislatures. HPV vaccine [Internet]. Denver (CO): NCSL; 2010 Apr [cited 2010 Sep 23]. Available from: <http://www.ncsl.org/default.aspx?tabid=14381>
- 2 Haas M, Ashton T, Blum K, Christiansen T, Conis E, Crivelli L, et al. Drugs, sex, money, and power: an HPV vaccine case study. *Health Policy*. 2009;92(2-3):288-95.
- 3 Haber G, Malow RM, Zimet GD. The HPV vaccine mandate controversy. *J Pediatr Adolesc Gynecol*. 2007;20:325-31.
- 4 Abdelmutti N, Hoffman-Goetz L. Risk messages about HPV, cervical cancer, and the HPV vaccine Gardasil: a content analysis of Canadian and US national newspaper articles. *Women Health*. 2009;49:422-40.
- 5 Fowler EF, Gollust SE, Dempsey AM, Lantz PM, Ubel PA. Headlines, policy, and vaccination: emergence of controversy in local media coverage of HPV vaccine legislation. Article under review.
- 6 Gostin LO, DeAngelis CD. Mandatory HPV vaccination: public health vs private wealth. *JAMA*. 2007;297(17):1921-3.
- 7 Schwartz JL, Caplan AL, Faden RR, Sugarman J. Lessons from the failure of human papillomavirus vaccine state requirements. *Clin Pharmacol Ther*. 2007;82(6):760-3.
- 8 Colgrove J. The ethics and politics of compulsory HPV vaccination. *N Engl J Med*. 2006;355(23):2389-91.
- 9 Hibbing JR, Theiss-Morse E. Congress as public enemy: public attitudes toward American political institutions. Cambridge: Cambridge University Press; 1995.
- 10 Cappella JN, Jamieson KH. *Spiral of cynicism: the press and the public good*. New York (NY): Oxford University Press; 1997.
- 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):1981-8.
- 12 California Department of Public Health. Number of cases of pertussis in California: pertussis summary report [Internet]. Sacramento (CA): The Department; 2010 Sep 21 [cited 2010 Sep 21]. Available from: <http://www.cdph.ca.gov/programs/immunize/Documents/PertussisReport9-21-2010.pdf>
- 13 Glanz JM, McClure DL, Magid DJ, Daley MF, France EK, Salmon DA, et al. Parental refusal of pertussis vaccination is associated with an increased risk of pertussis infection in children. *Pediatrics*. 2009;123(6):1446-51.
- 14 Sugerma DE, Barskey AE, Delea MG, Ortega-Sanchez IR, Bi D, Ralston K, et al. Measles outbreak in a highly vaccinated population, San Diego, 2008: role of the intentionally undervaccinated. *Pediatrics*. 2010;125(4):747-55.
- 15 Kahan DM, Braman D, Cohen GL, Gastil J, Slovic P. Who fears the HPV vaccine, who doesn't, and why? An experimental study of the mechanisms of cultural cognition. *Law Hum Behav*. Forthcoming 2010.
- 16 Leader AE, Weiner JL, Kelly BJ, Hornik RC, Cappella JN. Effects of information framing on human papillomavirus vaccination. *J Womens Health (Larchmt)*. 2009;18(2):225-33.
- 17 Gerend MA, Shepherd JE. Using message framing to promote acceptance of the human papillomavirus vaccine. *Health Psychol*. 2007;26(6):745-52.
- 18 Gans H. *Deciding what's news*. New York (NY): Vintage; 1979.
- 19 Patterson TE. *Out of order*. New York (NY): Vintage; 1994.
- 20 Baker L, Wagner T, Singer S, Bundorf M. Use of the Internet and e-mail for health care information: results from a national survey. *JAMA*. 2003;289(18):2400-6.
- 21 Davis MM, Fant K. Coverage of vaccines in private health plans: what does the public prefer? *Health Aff (Millwood)*. 2005;24(3):770-9.
- 22 Tarini BA, Singer D, Clark SJ, Davis MM. Parents' concern about their own and their children's genetic disease risk: potential effects of family history vs. genetic test results. *Arch Pediatr Adolesc Med*. 2008;162(11):1079-83.
- 23 Chang L, Krosnick JA. National surveys via RDD telephone interviewing versus the Internet. *Public Opin Q*. 2009;73(4):641-78.
- 24 Groves R. Nonresponse rates and nonresponse bias in household surveys. *Public Opin Q*. 2006;70(5):646-75.
- 25 The wordings of the two news briefs randomly assigned to participants are available in an online Appendix. To access the Appendix, click on the Appendix link in the box to the right of the article online.
- 26 University of Michigan, C.S. Mott Children's Hospital. Majority of US parents not in favor of state HPV vaccine mandates. National poll on children's health [serial on the Internet]. 2007 May 22 [cited 2010 Jan 4]. Available from: <http://www.med.umich.edu/mott/npch/reports/hpv.htm>
- 27 Vamos CA, McDermott RJ, Daley EM. The HPV vaccine: framing the arguments for and against mandatory vaccination of all middle school girls. *J Sch Health*. 2008;78(6):302-9.
- 28 Brodie M, Altman D, Deane C, Buscho S, Hamel E. Liking the pieces, not the package: contradictions in public opinion during health reform. *Health Aff (Millwood)*. 2010;29(6):1125-30.
- 29 Graber DA. *Mass media and American politics*. 8th ed. Washington (DC): CQ Press; 2008.
- 30 Nelkin D. *Selling science: how the press covers science and technology*. New York (NY): W.H. Freeman; 1987.
- 31 Habel MA, Liddon N, Stryker JE. The HPV vaccine: a content analysis of online news stories. *J Womens Health (Larchmt)*. 2009;18(3):401-7.