

**Risk Messages about HPV, Cervical Cancer and the HPV Vaccine Gardasil:
A Content Analysis of U.S. and Canadian National Newspaper and News
Magazine Articles**

by

Nazek Abdelmutti

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

The HPV vaccine (Gardasil) is a significant advancement in women's health that garnered both positive and negative media coverage. Since public opinion and population uptake of the vaccine can be influenced by media coverage, the purpose of this study was to assess the discussion and presentation of risk information about HPV, cervical cancer and the HPV vaccine in Canadian and U.S. newspapers and news magazines.

Using directed content analysis, the reporting of fear-inducing messages about HPV, cervical cancer and the HPV vaccine were compared between Canadian and U.S. top-circulating national newspapers between January 2006—December 2007. Significant differences between countries were found in the number of fear messages about cervical cancer ($p < 0.05$) but not for HPV or the HPV vaccine. Readability was higher than recommended for the public and emotional tone of the articles was progressively negative.

Directed content analysis was also used to assess the discussion of risks, fear-inducing messages about HPV, cervical cancer and the HPV vaccine in four high circulating North American news magazines from January 2006—December 2007. Risk messages about HPV and cervical cancer focused on threatening illness or injury and reporting on the HPV vaccine emphasized it being poorly understood by science.

Newspaper and news magazine articles on HPV, cervical cancer and the HPV vaccine included fear-inducing messages. Public health officials and health educators need to be aware of media reporting of fear based risk messages in order to alleviate public anxiety and concern about the HPV vaccine.

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Introduction

Human papillomavirus (HPV) is one of the most common sexually transmitted infections (STI's) in Canada, the U.S. and the world, with a peak in prevalence amongst adolescents and young adults (Health Canada, 2007; Centre for Disease Control [CDC], 2007; World Health Organization [WHO], 2008). The WHO estimates the global prevalence of genital HPV infections to be approximately 440 million (WHO, 2008). In Canada, approximately 75% of sexually active men and women will have at least one HPV genital infection in their lifetime (Health Canada, 2007). In the U.S., this estimation ranges from about 50% to 75% of sexually active adults (CDC, 2007; National Advisory Committee on Immunization [NACI], 2007). Estimations of prevalence vary because HPV infection is not a nationally notifiable or reportable disease in Canada or the U.S. Therefore, prevalence and incidence statistics are based on studies of select populations such as clinics or colleges. While no treatment is available for the virus itself, many immunologically competent individuals are able to clear the infection without treatment (Health Canada, 2007). However, failure to mount an appropriate immunological response can result in a persistent HPV infection (Stanely, 2006). Certain types of persistent HPV infections are the leading cause of cervical dysplasia and cervical cancer in women. Other variants can lead to genital warts, and anal, rectal, vaginal and penile cancers (NACI, 2007).

These ramifications of HPV exposure make a possible vaccine a welcome advancement in the field of health, and as expected, the introduction of Gardasil, the first vaccine against HPV, has brought much media and public attention. However, this scientific advancement has generated both positive and negative media attention. Questions

surrounding Gardasil's efficacy and safety beyond clinical trials, concerns about timing and rushed approvals, debates around policy and funding, and the controversy of vaccination programs for a STI being targeted towards young girls have attracted much media attention to the topic of HPV, cervical cancer and vaccination. The involvement of many stakeholders, each with a distinct objective, contributed to the mixed reactions from the public and health officials alike. These stakeholders included the pharmaceutical companies and their competitors, federal and provincial governments, health authorities and associations, individuals, and parents of young girls.

The pharmaceutical companies (Merck & Co. in the U.S. and Merck Frosst in Canada) received approval for Gardasil within a short time span in both countries (June 2006 in the U.S. and July 2006 in Canada). However, different courses of action were taken in regulating and implementing immunization programs through discussion of mandates in the U.S. and the implementation of voluntary immunization programs in Canada. In addition, variations in the laws regulating direct-to-consumer-advertising (DTCA) and different health care systems may have resulted in different discussions of the issue in the public arena in the U.S. and Canada.

The way in which the mass media cover a health issue can determine the degree to which the public is informed or misinformed and the extent to which public interest in that health issue is facilitated (Meredith, Eisenman, Rhodes, Ryan, & Long, 2007). For instance, certain aspects of media presentation can include messages that can be deemed "fright factors"; these are defined as aspects of a topic that may heighten perceptions of risk and trigger a sense of alarm and worry (Bennett, 1999).

Although newspaper and news magazine articles are not intended to be health education material, they can be used by the public as a source of health information.

Understanding the role risk messages in media can have in each country can help health journalists understand the impact of what is published, and aid health educators and public health officials in dealing with the challenges of introducing new health interventions. Public health campaigns can aim to address the possible sources of alarm and worry associated with certain health issues in an accurate and timely fashion. This can ensure the availability of credible risk information for the public through the utilization of various media outlets to disseminate health information.

In light of the many issues surrounding the approval of Gardasil, the aim of this study was to identify the prominent fear based risk messages included in major Canadian and U.S. national newspaper and news magazine articles addressing HPV, cervical cancer and the HPV vaccine Gardasil. Other variables that can influence the presentation of risk, such as readability, valence or tone and sources of information, were also examined. The first chapter of this study is a literature review outlining the role of media in health communication, models of health behaviour and risk communication, and the impact of policy on the HPV vaccine programs. The second and fourth chapters are presented as separate studies. The second chapter contains a content analysis that compares Canadian and U.S. national newspaper articles. Chapter 3 supplements the second chapter and details additional variables that were measured to assess the presentations of risk information in newspaper articles. The fourth chapter contains a content analysis of North American news magazines. A general discussion and interpretation of the two studies are presented in Chapter 5. Chapter 6 outlines the limitations of the studies and presents areas for future research.

CHAPTER 1: Literature Review

1.1 HPV and Cervical Cancer

Over 100 HPV types have been identified, and over 30 of those are known to infect the genital tract (NACI, 2007). Some HPV types are classified as ‘high risk’ because they can trigger the development of cancer whereas others are classified as ‘low risk’ because they rarely cause cancerous lesions but can lead to other abnormal growths (National Cancer Institute [NCI], 2008). Two high risk types (types 16 and 18) are responsible for about 70% of cervical cancer cases and two low risk types (types 6 and 11) cause 90% of genital warts. All cases of cervical cancer can be traced back to one of the cancer causing HPV types (CDC, 2007). The six most common variants worldwide (31, 33, 35, 45, 52 and 58) account for an additional 20% of cervical cancers (Clifford, Franceschi, Diaz, Munoz, & Villa, 2006). All cases of cervical cancer can be traced back to one of the cancer causing HPV types (NACI, 2007). Cervical cancer gradually develops due to a persistent HPV infection that lasts for years, during which the virus integrates itself into the cervical cells’ genome. Cervical dysplasia can follow, which refers to a pre-cancerous stage where abnormal growth begins in the epithelium of the cervix. Cervical dysplasia does not always progress to cancer. However if left untreated in some cases, the abnormal growth gradually becomes more invasive and severe. Carcinoma *in situ* develops when the entire epithelium is comprised of abnormal growth. This can further progress to invasive squamous cell carcinoma (NCI, 2008). Risk of

developing precancerous lesions or cervical cancer is increased in women who smoke, have multiple sexual partners, and women of low socio-economic status (Schiffman et al., 2007).

A Papanicolaou smear (Pap smear) is a screening test used to detect the presence of abnormal cells in the cervix. In countries with the available resources, the Pap test has led to a reduction in the incidence of invasive cervical cancer cases. Its continual use is of crucial importance in the detection of cervical dysplasia and reduction of cervical cancer (NACI, 2007). Of the estimated annual 500,000 cases of cervical cancer worldwide, over 80% occur in women in low income countries where routine Pap test screening programs are lacking (WHO, 2008).

1.2 The Gardasil Vaccine

In June 2006, the FDA approved Gardasil in the U.S., shortly followed by Health Canada's approval in July of the same year. Clinical trials investigated a bivalent and quadrivalent type of the vaccine. The quadrivalent type of the vaccine, which protects against types 6, 11, 16, and 18, is currently manufactured in the U.S. and distributed in Canada. Gardasil is administered in three doses over a six month period. It is notable to point out that although not all types of HPV can lead to cancer, regardless of which type of vaccine is administered, no vaccine will protect against all types of HPV. Unlike therapeutic vaccines which can be administered to treat a condition, a prophylactic vaccine, such as Gardasil, is preventive and needs to be administered before the occurrence of an infection to be protective against a particular HPV type (NCI, 2008). A second vaccine, which bivalent and manufactured by a competing pharmaceutical company, protects against HPV types 16 and 18; to date, this vaccine has not been approved for population use in North America.

Gardasil is recommended for use in females between the ages of 9 to 26. Girls aged 9 to 13 are included to preclude the onset of sexual activity (NACI, 2007). Females aged 14 to 26 who are sexually active can still benefit from the vaccine as they may not have had a HPV infection. Even if a woman is infected or has had previous Pap smear abnormalities, Gardasil is still recommended as it is highly unlikely for an individual to be infected with all four HPV types for which the vaccine protects. Further clinical trials will be needed to ascertain feasibility of vaccine use in males (Health Canada, 2007). Use in men and boys could decrease the risk of penile and anal cancers posed by HPV infection, and could also serve to limit the spread of the virus to male or female sexual partners (Olatunbosun, 2006). Concerns about the vaccine include lack of long term data, lack of extensive studies in young girls, and its high cost making it the most expensive childhood vaccine used for mass immunizations (Lippman, Melnychuk, Shimmin, & Boscoe, 2007).

1.3 Public Reaction to the Vaccine

1.3.1 Attitudes and Beliefs Surrounding HPV and the HPV Vaccine

Public knowledge of HPV (such as the link to cervical cancer and its prevalence) based on data gathered from various studies was generally found to be lacking prior to the introduction of Gardasil in the U.S. and Canada (Brewer & Fazekas, 2007; Ogilvie et al., 2007). The possibility of a vaccine against HPV becoming more feasible, and the eventual anticipated approval of Gardasil, prompted various researchers to investigate public knowledge about HPV and cervical cancer and public reaction to the vaccine. Prior to the

approval of the vaccine by the FDA, a U.S. study exploring the knowledge and beliefs of the general public about HPV and the introduction of a vaccine found that few people knew what the acronym stood for or knew of its connection to cervical cancer (Friedman & Sheppard, 2007). Discussion with study participants of HPV as a STI and its link to cervical cancer elicited feelings of alarm and worry. A stigma associated with HPV as a STI was found to be a barrier to communication about risks posed by HPV infections, or, the introduction of a vaccine. This stemmed from reactions to STI's in general, and brought forth references to promiscuity and infidelity (Friedman & Sheppard, 2007). Brown and colleagues (2007) found similar results in a Canadian study, also citing a lack of knowledge about HPV and cervical cancer, and the presence of a stigma associated with HPV being a STI.

The findings of these studies serve as a possible snapshot of the environment into which the vaccine was introduced. Therefore, it may be that heightened awareness of HPV in the media and the public arena is not due to the public health significance of HPV or cervical cancer in particular. Rather, the heightened awareness may reflect the attention placed on Gardasil. In fact, many researchers called for more public education about HPV, cervical cancer and screening programs to be coupled to the introduction and implementation of mass immunization programs (Brewer & Fazekas, 2007; Brown et al., 2007; Olatunbosun, 2006; Lippman, Melnychuk, Shimmin, & Boscoe, 2007).

A systematic review of U.S. studies found an overall positive reaction by adults towards receiving the vaccine and by parents towards the possibility of vaccinating their daughters (Brewer & Fazekas, 2007). Barriers to vaccination were found to include low perceived vaccine safety, cost, and concerns regarding changes in adolescent sexual behaviour after receiving the vaccination (Brewer & Fazekas, 2007). One study of U.S. women

(conducted before the approval of Gardasil) indicated a similar level of consent by mothers to have their son vaccinated as mothers who had daughters (67% of respondents who had a daughter stated consent to have their daughter vaccinated compared to 66% of respondents who had a son) (Slomovitz et al., 2006). Reasons for not consenting were based on beliefs that their son would not directly benefit from the vaccine. Fear based messages addressing these barriers and concerns in U.S. newspaper articles can serve to inform or increase worry if these concerns are incorrectly portrayed, or ignored.

The same capacity to inform or misinform may be found in Canadian newspaper articles that address Canadian concerns about the HPV vaccine. A Canadian study exploring parental attitudes towards a publicly funded HPV vaccination program found that parents generally had a positive attitude towards having their daughters vaccinated. However, they reiterated concerns about the effect of the vaccine on sexuality in teens and the need for education about safe sex practices in conjunction with the introduction of the vaccine (Ogilvie et al., 2007). Seventy-four percent of parents in the Canadian national survey expressed the intention to have their daughters vaccinated in a school based program (although the sample contained parents of girls aged 8 to 18, and the school program would be implemented for girls 11 and 12 years of age) (Ogilvie et al., 2007). The region with the highest percentage of parents who expressed intention to vaccinate was Atlantic Canada (83%); 75% of Ontario parents surveyed (who comprised the greatest portion of the study population) expressed intention to vaccinate their children. The study also found the strongest predictor of parents' intention to vaccinate their daughters was parental attitude towards vaccines in general and the HPV vaccine in particular.

1.3.2 Reactions to Policy

Differing opinions have emerged about the merit and motivations behind introducing mass HPV immunizations in the U.S. and Canada. The issue of lobbying appears to be more prominent in U.S. research and opinion papers (Haber, Malow, & Zimet, 2007; Wynia, 2007). Controversies surrounded a swift executive order by Texas Governor Rick Perry in February 2007 (which was eventually rejected) requiring girls entering middle-school (11 and 12 years old) to be vaccinated against HPV (Haber et al., 2007). This legislative action was put forth amid reports of Merck & Co. lobbying and contributing funds towards Governor Perry's re-election campaign and providing funding to "Women in Government", an organization of female legislatures involved in public policy that supported vaccine mandates (Wynia, 2007). These attempts sparked media attention and public rejection, and shifted the focus away from the benefits of Gardasil (Haber et al., 2007). Allegations of lobbying and lack of transparency in the motives for supporting Gardasil resulted in a lack of trust and fear by the public (Wynia, 2006). Reporting on these events and a focus on the public's apparent lack of trust in government and the pharmaceutical industry may be reflected in U.S. newspaper and news magazine articles.

Lobbying efforts were also a factor in Canada, but the ramifications were not as pronounced. Canadian concerns include the \$300 million dollars designated by the federal government to fund vaccination programs. The cost effectiveness and allocation of public funds for school based immunization programs [for girls in Grade 6 in Newfoundland, Labrador and Prince Edward Island, in Grade 7 in Nova Scotia, and in Grade 8 in Ontario for the 2007-2008 school year (Colucci, Hryniuk, & Savage, 2008)] and concerns over implementing such programs without long term data were debated (Lippman, Melnychuk,

Shimmin, & Boscoe, 2007). Those who opposed the implementation of mass immunization programs, such as the Canadian Women's Health Network, felt the money would be better spent in educating the public, improving screening programs for those who need it most, and funding independent clinical trials (Lippman et al., 2007). There were also concerns that the lack of long term efficacy and safety data about Gardasil prevents setting and achieving clearly defined goals, such as the projected impact on cervical cancer rates.

1.4 Factors Influencing Public Reactions to the Vaccine

1.4.1 Health Behaviour Models and Attitudes Towards Vaccinations

Various health behaviour models attempt to predict behaviour. For example, attitudes towards STI vaccines and other preventive health actions can be explained by the health belief model. Developed in the 1950's, the health belief model was developed to explain why people chose to participate or not to participate in disease detection and prevention programs (such as tuberculosis screening programs) (Hochbaum, 1958). The model is based on a value-expectancy concept, where the "value" is the desire to avoid illness and the "expectancy" is the belief that a health action would prevent illness (Janz, Champion, & Strecher, 2002). In accordance with the health belief model, people take action to prevent or alleviate an illness or condition if 1) they consider themselves as susceptible (perceived susceptibility) to the condition, 2) they believe the condition to have serious consequences (perceived severity), 3) they believe the available course of action would alleviate their susceptibility or the severity

of the condition, and 4) they believe the benefits of the suggested action outweigh barriers or costs (Janz et al., 2002).

One example of a health action that tends to be influenced by health beliefs is vaccination (Zimet, Mays, and Fortenberry, 2000). The decision or intention by individuals to be vaccinated is affected by beliefs about perceived susceptibility, perceived severity, confidence in the benefits of immunization, and by minimizing potential barriers. Assessing influenza vaccine acceptance in older adults, Telford and Rogers (2003) found that influencing beliefs about personal susceptibility and emphasizing the safety and efficacy of the vaccine improved vaccine uptake by older adults. The authors of the study argued that these were more important than recommendations by health professionals or government sources.

The perceived risk for STIs is a main determinant of vaccine acceptance (Slomovitz et al., 2006). Vaccine efficacy and cost are also influential factors (Zimet et al., 2000). STI vaccines in particular are subject to individual and parental beliefs and values around sexuality due to the target groups being young adolescents, just prior to the onset of sexual activity. Vaccinating young girls against a sexually transmitted infection is subject to parental beliefs about susceptibility, which is related to their beliefs about their child's sexuality (Zimet et al., 2000).

Cues to action, which are prompts that can initiate behaviour or information seeking, can also aid in facilitating readiness to take action (Hochbaum, 1958). Cues to action include materials that provide information or reminders, or promote awareness (Janz, Champion, & Strecher, 2002). Print media can serve as a cue to action by sparking interest and motivating people to initiate a conversation about a specific health factor (Schwitzer et al., 2005).

1.4.2 Health Risk Messages and Fear

Risk can be defined as uncertainty connected to future outcomes or as the probability and impact of an event with a potential positive or negative influence. This “event” can be termed a hazard, which is the agent or action that can cause negative health effects (Chartier & Gabler, 2001). Risk communication is “any purposeful exchange of information about health or environmental risks between interested parties” (Covello, von Winterfeldt, & Slovic, 1986).

Scaring people into doing something can be one strategy in getting their attention when communicating about risk (Witte, Meyer, & Martell, 2001). Fear can cause individuals to react emotionally and subsequently listen to and act upon that message (Witte et al., 2001). Many health risk messages are deemed “fear appeals”. According to Witte et al. (2001), fear appeals are messages constructed to persuade individuals to comply through fear arousal, and typically contain a fear component and an implicit or explicit recommended action (Witte et al., 2001). To understand the way in which fear appeals are processed, theorists have developed various models aiming to interpret the cognitive and affective dimensions of reactions to fear appeals. The Extended Parallel Processing Model (EPPM) builds upon previous research in the topic and stipulates that evaluating a fear appeal can result in two appraisals of the message (Witte & Allen, 2000). The first appraisal is an evaluation of the threat (severity and susceptibility). The more susceptible an individual believes they are to a threat, the more likely they are to begin the second appraisal, which is an evaluation of the efficacy of the suggested response. If the threat is perceived as irrelevant, then there is no motivation to further process the message. If the threat is perceived to be serious and relevant,

the perceived efficacy determines whether the individual will then control the danger of the threat, or attempt to control the fear. If an individual has confidence in their ability to act, they can then carry out the suggested action to lessen the threat. However, if an individual doubts the suggested action, or their ability to carry it out, they attempt to eliminate fear through denial, defensive avoidance, or reactance. According to the EPPM, a strong fear appeal is only beneficial if followed by a strong efficacy message (Witte & Allen, 2000).

While there is evidence that fear appeals can be effective, they do not always result in the desired reaction or action. Results obtained from controlled laboratory studies do not always translate in the “real world” where a variety of communications can affect reactions to fear and perceptions of risk (Hastings, Stead, & Webb, 2004). Indeed, the use of fear appeals can result in unintended consequences. For example, a powerful graphic antismoking advertisement could result in distress or anxiety that leads smokers to alleviate that stress by smoking more or engaging in other negative health behaviours, such as overeating, drug use or alcohol abuse (Hastings et al., 2004).

One review of the research reported that increasing the perceived severity and perceived susceptibility of a risk lead to effective messages (Witte & Allen, 2000). Research indicates that different segments of the population react differently to fear appeals and may require different forms of messages. Individuals with higher perceived knowledge about a topic usually react better to the message with lower levels of fear content. Furthermore, gender differences can influence how risk messages are processed. When varying levels of fear in a message are presented, males with a higher level of subjective knowledge exhibited less reactance and were more influenced by efficacy-only messages (Nabi, Roskos-Ewoldsen, & Carpentier, 2008).

1.4.3 Risk Perceptions

The public may react differently in situations that present a potential risk, whether the risk is environmental, natural or technological. Risk can be perceived in a variety of ways which are influenced by psychological factors and characteristics of a particular risk. For example, risk perceptions about food-borne illnesses may be centered around vulnerable populations, while risk perceptions around genetically modified foods are centered on ethical concerns and unintended effects on human health and the environment (Frewer, 2004). Alternatively, the source of the risk in natural and technological hazards can shape perceptions based on characteristics attached to the risk, such as the risk being perceived as a fatal threat, fate, a test of strength, a game of chance, or an early warning indicator (Renn, 2004)

In an effort to categorize why some risks bring about more fear than others, Bennett (1999) sought to compile a list of ‘fright factors’ which are defined as aspects of a risk that are worrying and unacceptable to the public. These fright factors were derived from a summary of psychometric research aiming to answer questions pertaining to risk perceptions and why certain risks can bring about alarm and worry that is unrelated to any scientifically estimated degree of risk. The complete list (**Figure 1**) outlines factors which make certain risks more concerning and worrying for the public. The factors can be viewed as interdependent and vary in importance based on different scenarios and populations. However, the framework of factors provides an organizing template from which public risk perceptions can be predicted (Bennett, 1999). This framework also allows for the segmentation of various aspects that could trigger alarm and fear towards HPV, cervical cancer and Gardasil separately.

Figure 1.1: Fright Factors (adapted from Risk Communication in Public Health (Bennett, 1999))

Risks are likely to cause worry and alarm if they are perceived:

1. To be involuntary rather than voluntary.
2. As inequitably distributed (some benefit while others suffer the consequences).
3. As inescapable by taking personal precautions.
4. To arise from an unfamiliar or novel source.
5. To result from man-made, rather than natural sources.
6. To cause hidden and irreversible damage, e.g. through onset of illness many years after exposure.
7. To pose particular danger to small children or pregnant women or more generally to future generations.
8. To damage identifiable rather than anonymous victims.
9. To threaten a form of death (or illness/injury) arousing particular dread.
10. To be poorly understood by science.
11. As subject to contradictory statements from responsible sources (or, even worse, from the same source).

Other fear typologies attempt to outline how risk perceptions are formed. An existential approach to risk perceptions employs a more philosophical view that attempts to understand the collective underlying motivations behind people's risk perceptions (Langford, 2002). Although this typology may help explain individual risk perceptions, it is not suited for identifying risk messages in a print media. Sandman (2001) also compiled factors that could explain public reactions to environmental risks by designating certain issues as "less risky" or "more risky" with the use of similar quantifying factors such as degree of dread and controllability. Though there is much overlap in the designations, Bennett's typology is inclusive, less redundant, and more applicable to non-environmental risks. It also provides a framework that can be systematically applied while coding.

1.4.4 Direct-to-Consumer Advertising

Direct-to-consumer advertising (DTCA) involves advertising pharmaceutical products to the general public with the aim of increasing patient inquiries and awareness of the product. Although regulated and monitored, pharmaceutical companies are able to directly advertise their products in the U.S., while it is more restricted in Canada to ensure that patients receive unbiased risk information from the prescribing physician (Baukus, 2004). Although Canadians are exposed to DTCA through access to U.S. media networks, exposure in the U.S. may be more pronounced due to numerous media outlets being more accessible, and having greater potential for reaching more segments of the population (and with greater saturation of the market audience).

The FDA recognizes three types of advertising (Mintzes, 2006). Reminders ads only include the brand name with no risk information required and no health claims about the

product. Disease oriented ads discuss a disease or condition and encourage consumers to ask their physician about an unspecified treatment. Full product ads include the brand name and health claims and are required to include risk information. Only reminder ads and disease-oriented ads are allowed in Canada. DTCA affects prescribing behaviour and patient requests. One study conducted in doctors' offices in the U.S. and Canada found that U.S. patients reported more advertising exposure and were more than twice as likely to request an advertised drug than Canadian patients (Mintzes, 2006).

Merck's advertising campaign in Canada and the U.S. began by introducing HPV and cervical cancer to the public without mention of the vaccine itself. This approach could have served to suddenly thrust HPV to the center of public and media attention, thereby affecting public knowledge and risk perceptions. TV commercials serve to advertise the product and are often lacking in complete and relevant risk information (Kaphingst, DeJong, Rudd, & Daltroy, 2004). The HPV vaccine was initially marketed as a "cancer vaccine", a claim that cannot yet be substantiated, as its effect on of cervical cancer has yet to be determined through long term follow up (Wynia, 2007). Results from one U.S. study were that pharmaceutical advertising for Gardasil superceded broadcast media as the channel through which parents heard about the HPV vaccine; in fact 83% of study respondents heard about the HPV vaccine through pharmaceutical advertising and 69% heard about the HPV vaccine through broadcast media. The greater likelihood of exposure to incomplete information and health claims through DTCA in the U.S. could contribute to the incorrect portrayal of Gardasil and misperceptions about the risks posed by HPV, which may be reiterated and reinforced in print media.

1.4.5 Different Health Care Systems

The fact that Canada and the U.S. have different health care systems may have an impact on media reporting of health issues. Canada's health care system is built upon the principles of equity and access for all (Evans & Roos, 1999). A single payer public system with private delivery controls costs and deters the marketing of health services as a commodity (Bennett & Adams, 1993). The challenges faced in sustaining the Canadian system include management of long wait times and overcrowding in hospitals (Graig, 1999).

Although Canada's public system is not without its flaws, the U.S. spends more on health care per capita and as a percent of gross domestic product (GDP) (Evans & Roos, 1999). In 2001, per capita spending was \$4,884 USD in the U.S. compared to \$2,792 USD in Canada; the percent of GDP was 14% in the U.S. and 10% in Canada (OECD, 2004). The U.S. has two publicly funded health care programs, Medicare and Medicaid, which serve seniors and certain categories of low income Americans, respectively. Many Americans are covered through group health plans tied to full-time employment. Yet, a significant portion of the population are either under- or uninsured and pay for their health care directly (Graig, 1999). Due to fragmented health coverage, the increasing and "shifting" of costs for the patients, the burden of unexpected medical costs, and potential financial devastation are more of a concern in the U.S.

The cost of prescription medications is also higher in the U.S., and Gardasil is no exception. The introductory cost of Gardasil from August to December 2006 was \$134.90 CDN per dose (for a total of \$404.70 CDN for three doses) in Canada, and \$152.10 per dose (for a total of \$456.30 CDN for three doses) in the U.S. (Patented Medicine Prices Review Board, 2007).

Canada's publicly funded health care system may serve to minimize the fear associated with the financial ramifications of the detection of HPV and the treatment of cervical dysplasia and cervical cancer (often invasive and costly). Lack of access to screening services and the overall financial impact of the disease may have more prominent coverage in U.S. media due to the impact of health care costs on individuals

1.4.6 The Social Amplification of Risk

Mass media have a large role in communicating about and potentially amplifying the perception of risks of the HPV vaccine as members of the public often obtain information about risk from the media (Bennett, 1999). The social amplification of risk proposes that risk events are depicted through many signals or messages that are generated and transmitted through communication channels, one of which is the media (Kasperson et al., 1988). This information interacts with broader psychological, social, and cultural factors that may increase or decrease public perceptions of risk (Kasperson et al., 1988).

The media can selectively focus attention on dramatic or rare risks while attenuating more serious ones (Kasperson & Kasperson, 1996). Amplification can lead to sensationalism particularly if the story involves aspects of blame, cover-ups, high profile individuals, or sex. These qualities of news stories can also be characterized as media triggers which can increase coverage of a certain story, or particular aspect of a story and include questions of blame, secrets and cover-ups, elements of human interest, and conflict (Bennett, 1999). The introduction of Gardasil contains all the aforementioned media triggers. The media can also be a channel for information about risk when personal experience is minimal or absent. While the media can amplify certain risks, a UK study has found that government agencies usually

did not successfully address such issues in their communications (Department of Health, 2003).

How a population handles risks can be guided by how social institutions reinforce norms that influence the public's conceptualization and management of risks (Kasperson & Kasperson, 1996). These institutions, which can vary in their goals, include government agencies and business corporations. The prevalent social and cultural orientations in a country could impact which fear-based messages and risks are emphasized and amplified. For example, Canada and the U.S. have different cultural and social perspectives deemed as "worldviews" that affect opinions and social norms for a variety of topics, including public health policies and how receptive people are to health claims (Kahan & Braman, 2006). Based on differences in health care funding and delivery, Canadians can be viewed to have a "solidaristic" perspective where collective needs override the needs of the individual; in contrast Americans tend to have an "individualistic" perspective where people are expected to secure their needs with little or no collective (societal) help (Kahan & Braman, 2006). Of course, there may be some individualistic emphasis in Canada around certain health issues, and some collective emphasis in the U.S. as well. These worldview "dichotomous" perspectives are clearly simplified generalizations.

1.5 The Role of the Media

1.5.1 Media and Health Communication

A common denominator in journalism is that a story has to sell to be deemed worthy of publication. Health stories are no different (Schwitzer et al., 2005). Health journalists are encouraged to discuss the potential benefits and harms of an intervention and to verify information from independent sources, but this is not always carried out (Schwitzer et al., 2005). Most members of the public are exposed to information about risk from the media (Bennett, 1999; Niederdeppe, Frosch, & Hornik, 2008). In fact, Dutta-Bergman (2005) argues that newspaper and magazine readership can be viewed as predictor of information-seeking behaviour beyond the physician because print media readership allows for an “autonomous” health information search. By serving as important sources of health information, newspapers and magazines produce an increased degree of “health consciousness” (or motivation to maintain good health) in the reader (Dutta-Bergman, 2005).

Although newspaper articles are an important source of health information for the public, they can either rectify misconceptions or present incomplete, inaccurate information and amplify concerns amongst the public (MacDonald & Hoffman-Goetz, 2002). The accuracy and inclusiveness of information, and context in which the articles are written can be crucial to the public reaction to HPV and the Gardasil vaccine. The concept of media agenda setting states that the media can decide the importance of an issue by allocating attention and time to its coverage (Glanz, Rimer, & Lewis, 2002). Based on the different reactions to vaccine policies between Canada and the U.S., the media may allot more coverage towards certain issues in each country and, thereby, designate importance to certain issues and ignore

others (such as the possibility of a focus on lobbying in the U.S. overtaking information about the merits of Gardasil). Emphasizing specific topics or controversies can affect how individuals and communities as a whole discuss pertinent issues (Glanz et al., 2002). Therefore, chosen sources of information or lack thereof, quotations taken out of context, increased coverage of certain advocacy groups and policy debates all shape the discourse about HPV and Gardasil in the public arena. Sources of information are important because messages are judged by their source before their content; this highlights observations by researchers that credible sources of information can increase the impact of the content (Bennett, 1999; Smith, Bauman, Mckenzie, & Thomas, 2003).

1.5.2 Previous Analyses of Newspaper Articles

The role that media plays in communicating about HPV and cervical cancer is illustrated by media analyses of what is published on the topic. A recent study provided an analysis of news media coverage of HPV published from 1995 to 2002 by examining the information presented in U.S. newspaper articles. The start date coincided with the introduction of data verifying the link between specific HPV types and cervical cancer. The results from that study showed that additional information was needed to serve the educational needs of the public about HPV (Calloway, Jorgensen, Saraiya, & Tsui, 2006). However, the sample used was collected before discussions of an HPV vaccine surfaced and did not capture the extent of media coverage in more recent years.

Another study exploring U.S. newspaper articles written about HPV, before the approval of Gardasil, reported similar results (Anhang, Stryker, Wright, & Goldie, 2004). While many newspaper articles were found to include general information about the HPV

vaccine, detailed information was lacking (such as information about specific HPV types and how HPV infections can result in cervical cancer). The lack of complete health information in U.S. print media was also extended to STI's in general (Davidson & Wallack, 2004). This makes print media an unreliable source of information about HPV. However, in a recent U.S. based study, Hughes et al. (2009) found that media was cited as a source of information about the HPV vaccine (although the accuracy of information was not assessed). This suggests the occurrence of incorrect past reporting about HPV that may influence how the public interprets more recent information about the HPV vaccine. There were no studies to date assessing Canadian newspaper coverage of HPV or the HPV vaccine.

1.5.3 Media Coverage of Vaccines

Unfortunately, media sources do not always provide balanced and complete information about vaccines, which may influence vaccine acceptance (Danovaro-Holliday, Wood, & LeBaron, 2002; Goodyear-Smith et al., 2007). For example, negative media coverage of the pertussis vaccine and the MMR vaccine was correlated with a decrease in vaccine confidence and uptake, and skewed portrayals of perceived vaccine efficacy (Goodyear-Smith et al., 2007; Gangarosa et al., 1998). These kinds of news reports about vaccines are relevant for those involved in public health campaigns because vaccine acceptance is influenced by health beliefs (such as perceived susceptibility) and confidence in the benefits of immunization (Slomovitz et al., 2006; Zimet, Mays, & Fortenberry, 2000). The amplification of factors that raise concern, anxiety or fear about the implementation of the HPV vaccine could also contribute to both the failure to present accurate and balanced risk information, and the lack of vaccine uptake by the concerned public.

CHAPTER 2: Risk Messages about HPV, Cervical Cancer, and the HPV Vaccine in Canadian and U.S. National Newspapers

2.1 Research Question

The purpose of this study was to describe the presentation and portrayal of risk messages by comparing the type and frequency of fright factors about HPV, cervical cancer and the HPV vaccine in Canadian and U.S. national newspapers articles published shortly before and after the HPV vaccine was approved and implemented into policy. More specifically, this study was designed to explore the coverage and presentation of fright factors about the HPV vaccine in national newspapers.

2.2 Rationale

While previous content analyses of health news stories have explored the accuracy and inclusiveness of reporting on STI's (including HPV) ((Calloway, Jorgensen, Saraiya, & Tsui, 2006; Anhang, Stryker, Wright, & Goldie, 2004; Davidson & Wallack, 2004), none have examined how attributes of fear or “fright” about HPV, cervical cancer and the HPV vaccine are presented in mass print media. Given the role of media in the presentation and amplification of risk, understanding the types of risk messages in the media can help health journalists understand the impact of what is published, and aid health educators, health care

providers and public health officials in proactively addressing possible sources of alarm and worry associated with health issues in an accurate and timely fashion.

The approval and implementation process of Gardasil in Canada and the U.S. had both similarities and differences. Close geographical proximity and exposure to similar media outlets would likely result in some overlap of news stories that may not be covered in geographically distant countries. Also, other countries have implemented different HPV immunization programs that would make a comparison difficult (for example, the U.K. has chosen Cervarix, a bivalent HPV vaccine yet to be approved in Canada or the U.S., for its immunization programs (NHS, 2008)).

2.3 Hypotheses

There were two hypotheses underlying this study. The first hypothesis was that the types of fright factors in Canadian and U.S. national newspapers would not differ due to the “universal” impact of health beliefs on vaccine uptake and similar issues and concerns about HPV, cervical cancer and the HPV vaccine prior to the introduction of the vaccine in both countries (Brewer & Fazekas, 2007; Zimet, et al., 2000). The second hypothesis was that the number, or the volume, of fright factors cited would differ between the two countries due to varying courses of action (such as the introduction of mandates in the U.S.), laws governing the use of DTCA advertising, health care systems, and social/cultural perspectives.

2.4 Methods

2.4.1 Sample Selection and Data Sources

News coverage of the Human Papillomavirus (HPV) vaccine (Gardasil) published between January 2006 and December 2007, inclusive was evaluated. The online databases LexisNexis Academic and Factiva were used to obtain news stories about the HPV vaccine. To focus the study on highly visible news stories that were more likely to reach a large audience, two national newspapers were searched in Canada—The Globe and Mail (average weekly circulation for the years 2006 and 2007: 333,475 and 335,013) and The National Post (average weekly circulation for 2006 and 2007: 214,118 and 240,030)—and in the United States two national newspapers were searched — The Wall Street Journal (average weekly circulation for 2006 and 2007: 2,011,882 and 2,043,235) and USA Today (average weekly circulation for 2006 and 2007: 2,293,137 and 2,269,509)—to find articles about the HPV vaccine. The Toronto Star was also included as part of the Canadian news coverage. Although this newspaper is not considered national in distribution, the circulation numbers (average weekly circulation for 2006 and 2007: 447,145 and 452,502) indicate an audience reach greater than either of the two national papers. The New York Times (average weekly circulation for 2006 and 2007: 1,037,828 and 1,086,797) was included as a national newspaper and a newspaper of record in media outlets for the U.S. (Audit Bureau of Circulations [ABC] 2008). Information about circulation rates for each of the newspapers was based on average circulation rates from Monday to Friday and was obtained from the Audit Bureau of Circulations (ABC 2008).

Because the HPV vaccine (Gardasil) is directed against HPV, an important etiologic factor in the development of cervical cancer, the search of news coverage of the HPV vaccine also included articles that mentioned HPV and cervical cancer linked to the vaccine. The search of the two databases was conducted using the search string “(HPV OR human papillomavirus) AND cervical cancer AND (Gardasil OR vaccine)” in the title or text, with a date range from 01/01/2006 through 12/31/2007, and limited to the chosen newspaper outlets. This time period was chosen because it included news stories published shortly before or after approval of Gardasil by the U.S. FDA (June 8, 2006) and Health Canada (July 18, 2006) and the release of recommendations from federal advisory boards (on February 15th, 2007 by the National Advisory Committee on Immunization at the Public Health Agency of Canada and March 12th, 2007 by the Advisory Committee on Immunization Practices at the CDC). This was also a time frame when public policies about the vaccine were being discussed or implemented, making the personal relevance of the information in the articles an immediate one to the reader who may be a parent concerned about their daughter or an individual contemplating vaccination.

The search of LexisNexis and Factiva resulted in 167 total news articles (80 Canadian and 87 U.S. articles) from the six media outlets. After the full text was received, articles were reviewed and those not appropriate to the study were excluded; excluded articles were those mentioning cervical cancer or HPV but without coverage about the vaccine. When duplicate news stories were published in different newspapers within each country (Canada or U.S.), only the first newspaper to publish it was counted in the total tally (i.e., coded only once). Articles were included if all three keywords (HPV, cervical cancer, Gardasil or HPV vaccine) appeared at least once in the article.

2.4.2 Data Coding Process

To develop the coding instrument, a directed content analysis approach was used. Directed content analysis is based on an *a priori* theory or framework which allows for interpretation of the text in a systematic way and where the text can be coded to assess emergent themes (Hsieh & Shannon, 2005). Initial coding was based on Bennett's diagnostic checklist of fright factors which affect public perception of risk and inform health risk communication (Bennett, 1999). Throughout the coding process, this typology of fright factors was applied to the news stories on HPV, cervical cancer and the HPV vaccine (**Table 1**). Articles were read in an iterative fashion and new or emergent themes (as relevant to fright factors) were coded as they appeared in the news article text within a category identified as "Other". These emergent themes included: pharmaceutical lobbying, promiscuity and changes in sexuality, and the effect of the vaccine on screening practices. To ensure reliability of the coding, approximately 15% (n = 25) of the articles were read and coded independently by two researchers, and the results were compared. No disagreements or discrepancies in coding by the two researchers occurred. The primary author then coded the remaining articles.

Table 2.1: Bennett's fright factor diagnostic checklist for HPV, cervical cancer, and HPV vaccine news stories

Fright Factor	Application to HPV, Cervical Cancer or HPV Vaccine
Threaten a form of death, illness or injury arousing dread	HPV: etiologic agent behind genital warts, cervical cancer, other cancers Cervical Cancer: descriptions of cervical cancer progression and treatment, morbidity/mortality rates
Inescapable by taking personal precautions	HPV: very high prevalence, confidence in protective measures Cervical Cancer: sensitivity/ specificity of screening methods
Arise from unfamiliar or novel source	HPV: lack of public awareness about prevalence and link to cervical cancer Cervical Cancer: lack of public knowledge
Result from man-made sources	HPV Vaccine: consequences of policies, rushed approval, reports on side effects
Cause hidden or irreversible damage	HPV: may cause cervical cancer years later, some individuals unaware of infection Cervical Cancer: slow progression of disease
Pose particular danger to small children	HPV Vaccine: uncertainty associated with target group (young girls); effect of current policy on future health
Inequitably distributed	Cervical Cancer: higher risk with lower SES/under-served populations HPV Vaccine: cost concerns, only girls vaccinated
Damage identifiable victims	Cervical Cancer: experiences of victims HPV Vaccine: experiences of adverse events
Poorly understood by science	HPV: no definitive treatment for virus HPV Vaccine: lack of long term data on efficacy, safety
Subject to contradictory statements from responsible sources	Cervical Cancer: high versus low risk HPV Vaccine: highly effective and warranted for mass use versus needing more research and not yet warranted for mass use
Involuntary	N/A

This study focused on the volume (number) and type of fright factors in news stories about the HPV vaccine in Canadian and U.S. high-circulating newspapers. However, individual perception of risk involves more than the identification of a fright factor (Sjoberg 2002); emotional tone (valence) of the article influences how people interpret information (Grabe & Kamhawi, 2006). Tone was classified as positive or negative using the analytical approach of Taylor and Sorenson (2002). Positive tone (positive valence) is illustrated by the appearance of words such as “confidence”, “triumph”, “tremendous” and “100% effective” in the article text. Negative tone (negative valence) was captured by words such as: “scary”, “difficult”, “unwelcome”, and “controversy”. The total number of positive and negative valence words in each news article was determined and a tally was recorded. Articles were designated as neutral if there were equal numbers of positive and negative words or if there were no words coded as either positive or negative in the news article.

2.4.3 Additional Variables Examined

Other coded variables included the month and year of publication and article readability. Readability was assessed because it can influence the degree to which the public understands the information and the public’s ability to make an informed decision (Lunin, 1987). Readability of each news article was assessed using a “Simple Measure of Gobbledygook” (SMOG) analysis online calculator, which assigned a reading grade level (RGL) score based on the number of sentences and polysyllabic words in the article (WordsCount 2007). This score represents the level of attained education needed to understand a text (McLaughlin, 1969).

2.4.4 Data Analysis

Articles were coded manually, and text and codes entered in NVivo software (QSR International, NVivo 7). This software enables the user to arrange coding categories into free nodes or hierarchical tree nodes. For this analysis, the tree nodes were “HPV”, “Cervical Cancer” and “HPV vaccine”, with the fright factors as the sub-nodes. The number of times each sub-node was coded in the article text for each country was obtained.

Descriptive statistics were generated to give general, summary information about the HPV vaccine articles using SAS (Version 9.1; SAS/STAT®). Simple analyses were conducted using cross tabulations and Chi-Square tests to explore associations between country and fright factor. Fright factors with no cases (no mentions) or low cell counts were removed prior to performing the Chi-Square analysis to confirm statistical validity of the test (Sirkin, 2005). To ensure that no more than 20% of cells had an expected cell count less than 5 (Sirkin, 2005), cells with a combined expected frequency of less than five were excluded from the analysis. Simple regression analysis was used to determine whether the emotional tone of the Canadian and U.S. articles changed over time (the model was based on article valence plotted over time using a designation of 1 for positive article, 0 for neutral articles, and -1 for negative articles). Analysis of variance using a general linear model was used to test differences in the rate of change in valence between the two countries. Unpaired t tests were applied to the readability level (SMOG analysis) as a function of country where the articles were published. All values presented are means with 95% confidence intervals, and $p < 0.05$ was accepted as statistically significant.

2.5 Results

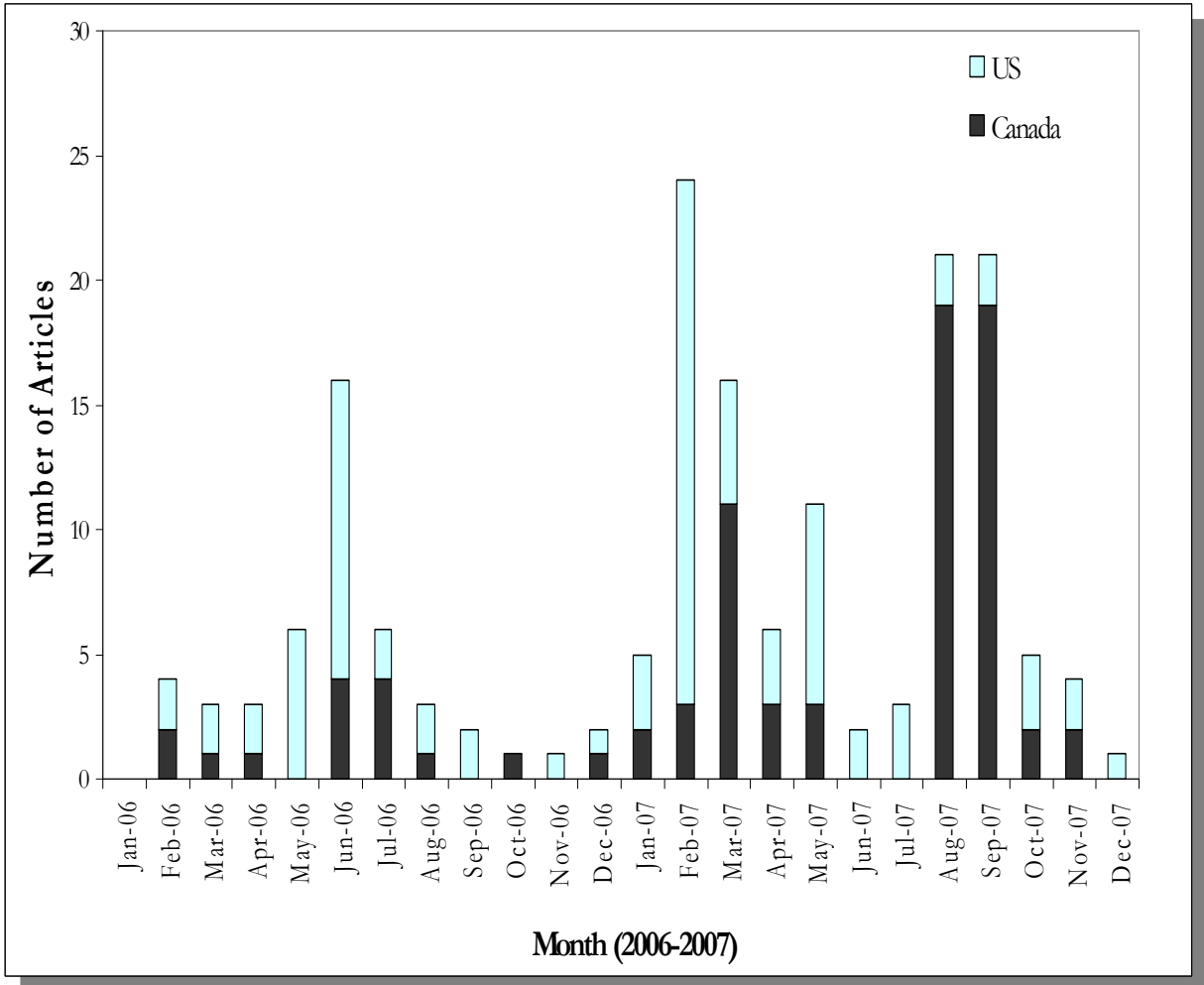
2.5.1 Coverage by Country

A total of 79 news articles were identified on the HPV vaccine from the three Canadian newspaper outlets and 85 from the three U.S. newspaper outlets for the period January 1, 2006 through December 31, 2007. The distribution of articles in the Canadian newspapers was 39% in The Globe and Mail, 27 % in The National Post, and 34% in The Toronto Star. U.S. national newspapers had almost 2 times the volume coverage in The New York Times 45% compared with USA Today 25%, whereas The Wall Street Journal had a volume of coverage falling between these two 31%. The overall difference in volume of news articles between the two countries was not statistically significant.

2.5.2 Coverage by Month and Year

Spikes in the number of articles reporting about HPV, cervical cancer and the HPV vaccine between the two countries occurred in June 2006 (5% of Canadian newspaper articles; 14% of U.S. newspaper articles), February 2007 (4% of Canadian articles; 25% of U.S. articles), and August-September 2007 (48% of Canadian articles; 5% of U.S. articles) (Figure 1). These spikes likely correspond to FDA and Health Canada approvals (June 8, 2006 and July 18, 2006, respectively), attempts to introduce vaccination mandates in Texas in February 2007, and the beginning of the school year which included the implementation of universal immunization programs of girls in school in Canada.

Figure 2.1: Total number of articles on HPV, cervical cancer and the HPV vaccine published per month in Canadian and U.S. national newspapers



2.5.3 Coverage by Fright Factors

The volume (i.e., number of citations) and type of fright factors were coded separately for HPV, cervical cancer, and the HPV vaccine in Canadian and U.S. newspaper articles (Table 2.2). No statistically significant difference was found in the overall volume of fright

factors mentioned in Canadian and U.S. newspapers with reference to HPV (Chi-Square: 1.89, $df=3$, $p = n.s.$). Fright factors included in the analysis were: threaten death, illness or injury, inescapable, unfamiliar or novel source, and hidden or irreversible damage. For coverage in both countries, the fright factor cited most often about HPV was that of threatening death, illness or injury; this was followed by descriptions of HPV as being inescapable or pervasive in the population. Examples of HPV and fright factors taken from the Canadian and U.S. media reports are illustrated by the following quotes:

HPV fright factor: threaten death, illness, or injury

CANADA: "...the four strains of HPV targeted by the vaccine cause an estimated 36,000 new cases of female genital warts each year in Canada, resulting in more than 85,000 doctor's visits for diagnosis and treatment." The Globe and Mail (December, 2006)

CANADA: "These virus types are responsible for most cases of cervical cancer, almost all cases of genitals warts, many cases of vaginal and vulvar cancer as well as pre-cancerous lesions or abnormal cells..." The National Post (August, 2007)

U.S.: "Persistent infection with certain HPV types leads to cervical cancer." USA Today (April, 2006)

U.S.: "Instead, both vaccines aim to prevent patients from becoming infected with two types of HPV -- types 16 and 18 -- that are thought to cause 70% of cervical-cancer cases world-wide." The Wall Street Journal (August 2007)

Table 2.2: Volume (percent) of fright factor citations in Canadian and U.S. national newspapers

Fright Factors	HPV			Cervical Cancer			HPV Vaccine		
	C (%)	US (%)	Total	C (%)	US (%)	Total	C (%)	US (%)	Total
threaten death/illness/injury	121 (47)	135 (53)	256	76 (54)	65 (46)	141	0 (0)	0 (0)	0
inescapable	49 (49)	52 (51)	101	8 (53)	7 (47)	15	0 (0)	0 (0)	0
unfamiliar or novel source	9 (64)	5 (36)	14	1 (100)	0 (0)	1	0 (0)	0 (0)	0
result from man-made sources	0 (0)	0 (0)	0	0 (0)	0 (0)	0	28 (47)	32 (53)	60
hidden/irreversible damage	31 (53)	27 (47)	58	6 (75)	2 (25)	8	0 (0)	0 (0)	0
damage identifiable victims	0 (0)	0 (0)	0	15 (75)	5 (25)	20	2 (100)	0 (0)	2
inequitably distributed	0 (0)	0 (0)	0	8 (30)	19 (70)	27	56 (60)	37 (40)	93
pose danger to small children	0 (0)	0 (0)	0	0 (0)	0 (0)	0	17 (55)	14 (45)	31
poorly understood by science	0 (0)	3 (100)	3	0 (0)	0 (0)	0	63 (66)	33 (34)	96
contradictory statements	0 (0)	0 (0)	0	2 (67)	1 (33)	3	19 (70)	8 (30)	27
involuntary	0 (0)	0 (0)	0	0 (0)	0 (0)	0	0 (0)	0 (0)	0
Total	210 (49)	222 (51)	432	116 (54)	99 (46)	215	185 (60)	124 (40)	309

In contrast, significant differences were observed in the overall volume of fright factors for cervical cancer by country in which the articles were published (Chi-Square: 11.40, $df = 4$, $p < 0.05$). Fright factors included in the analysis were: threaten death, illness or injury, inescapable, hidden or irreversible damage, damage identifiable victims, and inequitably distributed. More fright factor mentions appeared in news articles from Canadian compared with U.S. media outlets (116 occurrences in 79 articles vs. 99 occurrences in 85 articles). Similar to the findings for HPV, news coverage in both countries cited cervical cancer as threatening death, illness or injury more than any other fright factor. Canadian newspapers appeared to have a greater frequency of citations under the hidden and irreversible properties of cervical cancer and introduced identifiable victims contributing 75% of the citations for each of these two fright factors. Data from U.S. newspapers suggested a greater emphasis on the inequitable distribution of cervical cancer compared to Canadian newspapers (70% U.S. vs. 30% Canadian of total citations). Representative examples of fright factors identified about cervical cancer are given below:

Cervical cancer fright factor: hidden and irreversible

CANADA: "The Pap test didn't catch it, and when it doesn't, cervical cancer is incredibly hard to detect until in most instances it is too late..." The Toronto Star (August 2007)

CANADA: "Some diseases, such as cancer, cannot be successfully treated once they progress beyond a certain stage." The Globe and Mail (March, 2007)

U.S.: "Pap testing is effective only because it is done often; a lesion can take 10 years to turn into a cancer..." The New York Times (January, 2007)

U.S.: “Cervical cancer grows slowly, and it is long-lasting HPV infection that leads to the disease.” USA Today (November, 2007)

While the total number of fright factors mentioned about the HPV vaccine varied between the two countries, the overall difference was not statistically significant (Chi-Square: 7.22, df = 4, n.s.). Fright factors included in the analysis were: result from man-made sources, inequitably distributed, pose danger to small children, poorly understood by science, and subject to contradictory statements. Similar to cervical cancer, more fright factor mentions appeared in news articles from Canadian compared with U.S. newspapers (185 occurrences in 79 articles vs. 124 occurrences in 85 articles). Citations under fear of man-made sources tended to be slightly more prominent in U.S. (53% of citations) than in Canadian (47% of citations) newspapers. The opposite pattern was observed for the volume of coverage of the fright factors “poorly understood by science” and “contradictory statements”; here, 66% and 70%, respectively, of citations were from Canadian newspaper sources. Examples of quotes of fright factors about the HPV vaccine in the newspaper outlets in Canada and the U.S. are shown below:

HPV vaccine fright factor: poorly understood by science

CANADA: “However, it's not known how long its protection will last or if women will have to receive booster shots later in life.” The Globe and Mail (June, 2006)

CANADA: “Lead author, McGill University epidemiologist Abby Lippman, warned that the long-term effects of the Gardasil vaccine are not known.” The National Post (November, 2007)

U.S.: “Public health officials want to vaccinate girls early, before they become sexually active, even though it is not known how long the immunity will last.” The New York Times (July, 2006)

U.S.: “However, an editorial comment accompanying the Lancet article noted that while the data are encouraging, their interpretation has limitations given the short follow-up period of the trial, which averaged 15 months.” The Wall Street Journal (June, 2007)

Significant differences were observed in the volume of citations for emergent themes (other category) between the two countries (Chi-Square: 8.74, $df = 2$, $p < 0.01$). A total of 55 citations were found for pharmaceutical lobbying (Canada: 21 [38%]; U.S.: 34 [62%]), 48 citations were found for references to promiscuity and changes in sexuality (Canada: 29 [60%]; U.S.: 19 [40%]), and 21 citations were found for references to vaccine effects on screening and safe sex (Canada: 15 [71%]; U.S.: 6 [29%]). Results of coding for pharmaceutical company lobbying suggested a greater emphasis by U.S. newspapers than Canadian newspapers. However, articles in Canadian newspapers appeared to have a greater emphasis on screening and safe sex practices and on concerns of promiscuity and changes in sexuality than did the articles from U.S. newspapers. Examples of quotes of emergent themes about the HPV vaccine in news media outlets in Canada and the U.S. are shown below:

Emergent theme: promiscuity and sexuality

CANADA: “critics charge the vaccine amounts to a license for young women to be sexual promiscuous.” The Toronto Star (August, 2006)

CANADA: "...several Catholic school board trustees in Ontario raised objections, suggesting that administering the shots in their schools would in effect condone premarital sex." The National Post (September, 2007)

U.S.: "Some opponents have argued that inoculating girls against a sexually transmitted disease might send the message that sexual activity is acceptable." The Wall Street Journal (June, 2006)

U.S.: "...opponents have cited factors like the drug manufacturer's profit motive and the fear that inoculating young girls will encourage them to be sexually active." The New York Times (May, 2007)

Emergent theme: pharmaceutical lobbying

CANADA: "Some also whisper that it stems from too a cozy relationship with the pharmaceutical company that makes the vaccine." The Globe and Mail (2007)

CANADA: "Some critics questioned Health Canada's speedy adoption of Gardasil, saying it followed a massive lobbying campaign by its makers, Merck-Frost." The National Post (November, 2007)

U.S.: "Prompted in part by a vigorous lobbying campaign by Merck, which stands to earn billions of dollars if the vaccine is required, legislators....proposed mandating vaccination against HPV for girls as young as 11." USA Today (February, 2007)

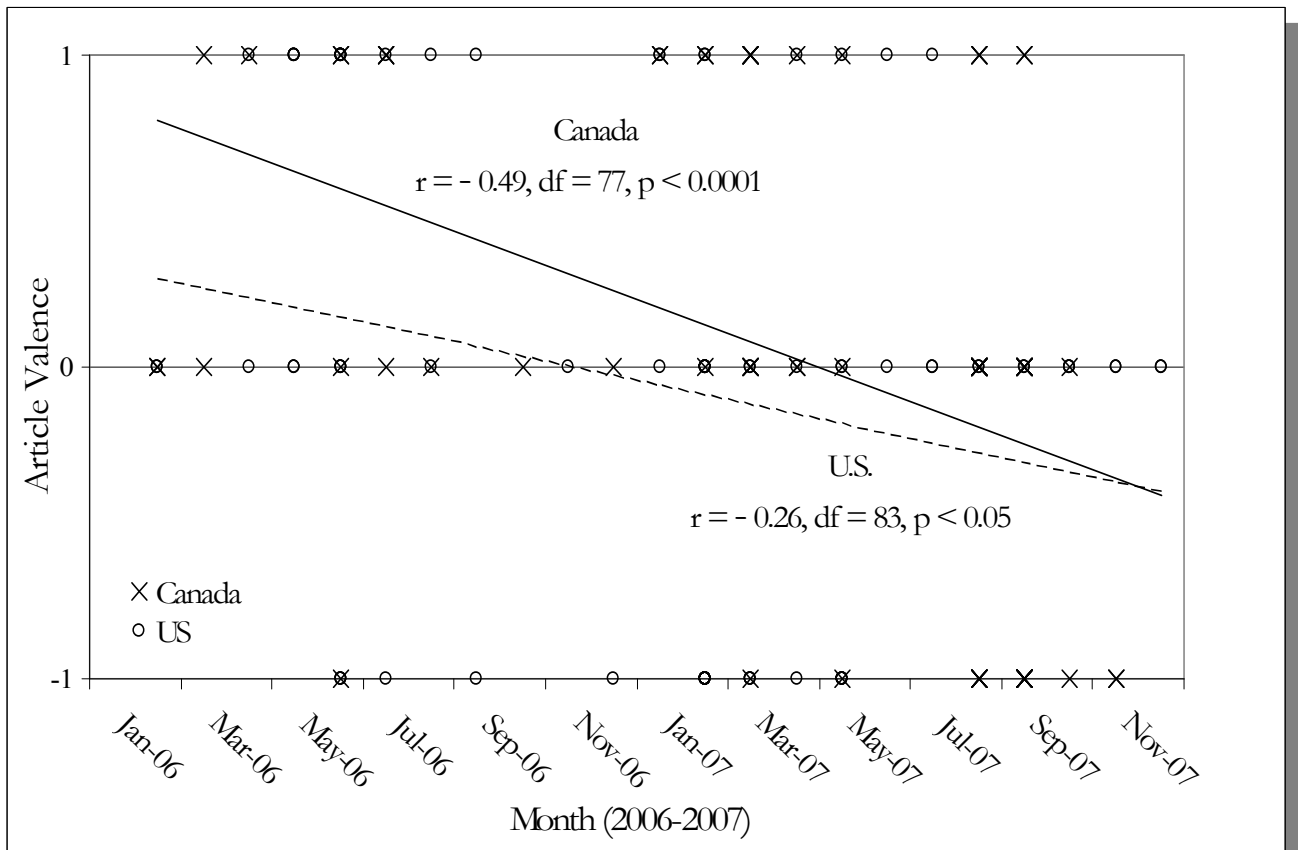
U.S.: "Merck aggressively lobbied state legislatures to make vaccination a school requirement for 11- and 12- year old girls..." The Wall Street Journal (May, 2007)

2.5.4 Other variables affecting risk presentation and understanding

2.5.4.1 Valence of Article. No statistically significant difference was observed between Canadian and U.S. newspaper coverage of the HPV vaccine with respect to the frequency of positively or negatively valenced news articles (Canada: 29% positive, 28%

negative, 43% neutral; U.S.: 26% positive, 32% negative, 42% neutral). Regression analysis indicated that articles in the Canadian ($r = -0.49$, $df = 77$, $p < 0.0001$) and U.S. ($r = -0.26$, $df = 83$, $p < 0.05$) newspapers had a more negative tone over time, albeit this association was weaker for the U.S. (**Figure 2**). No statistically significant difference was found in the rate of change in valence between Canada and the U.S., indicating that one country did not become more negative over time than the other.

Figure 2.2: Change in valence over time in the discussion of the HPV vaccine in Canadian and U.S. national newspaper articles



2.5.4.2 *Readability Level.* The reading grade level (RGL) as determined by SMOG for articles on the HPV vaccine published in Canadian and U.S. newspapers was considerably higher than recommended for the general public. Materials written at or below the 5th grade reading level were categorized as excellent, those written at the 6th to 8th grade reading level were categorized as adequate, and those written at 9th grade reading level or higher as unsuitable (Doak, Doak, & Root, 1996). Articles published in Canadian newspapers were written at a lower average RGL of 14.6 (95% CI = 14.4-14.9) compared to those published in U.S. newspapers (15.2 RGL, 95% CI = 14.8-15.5). The difference in RGL between news articles on HPV, cervical cancer and the HPV vaccine published in the U.S. and those published in the Canadian newspaper outlets was significant ($t = -2.4, p < 0.05$).

2.6 Discussion

This directed content analysis of Canadian and U.S. national newspapers revealed two important and novel findings with respect to inclusion of fright factors in news coverage of the HPV vaccine. First, whereas the types of fright factors identified between the two countries were similar, statistically significant differences were found in the overall volume of fright factors for cervical cancer, but not for HPV or the HPV vaccine. Second, significant overall differences by country were found in emergent themes. Factors that influence the differences in reporting between the two countries may be due to differences in social/cultural normative perspectives and health care funding and delivery.

Similarities in fright factor volume were found between Canadian and U.S. national newspapers in reporting about HPV. Many articles reported on prevalence rates and the

sequelae of HPV infection (coded as threatening death, illness or injury or as being inescapable when high rates were emphasized). Reporting on statistical information of this nature was mirrored in a content analysis of newspaper articles covering STI's and illustrates the type of information journalists deem as newsworthy (Davidson & Wallack, 2004). For example, journalists were more likely to report on STI's if supplied with new or striking information on the statistics or consequences of infection. This, combined with findings that HPV news coverage omits accurate cancer risk information and that most women with HPV do not progress to cervical cancer (Anhang, Stryker, Wright, & Goldie, 2004), may serve to heighten or bias risk perceptions about HPV and its role in the development of cervical cancer.

Significant overall differences were observed between the two countries in newspaper reporting about cervical cancer. Possible differences in the frequency of some fright factors over others may be linked to distinct cultural and social orientations and the impact of health care funding and delivery. Canadian newspapers constituted a higher percentage of citations for "identifiable victims" than did the U.S. newspapers. The reason for this difference is not clear from our results but may be due to differing societal and health values and normative frames. Canada has a public health care system which more reflects a "solidaristic" perspective; this perspective emphasizes that collective needs supercede individual needs and society secures the necessities of life for the individual. In contrast, an "individualistic" orientation is one in which individuals are expected to obtain their own needs without (or only with limited) collective help (Kahan & Braman, 2006). Emphasis on the impact of cervical cancer on the individual in Canada could be indicative of this collective sense of responsibility to meet health care needs for all individuals and an inclination to personalize the commitment to the collective good. In contrast, the greater proportion of citations on the

inequitable distribution of cervical cancer in articles from U.S. newspapers could be indicative of the lack of collectivism and the burden of disease on uninsured Americans. Socioeconomic differences in cervical cancer mortality exist in both countries, but the disparity was found to decrease in Canada while it endured in the U.S. (Ng et al., 2004). While definitive reasons for these disparities are not clear, some of the disparity can be attributed to differences in access to preventive health care services.

Though not statistically significant, differences in reporting can further be seen based on differing overarching perspectives in the Gardasil debate. Canadian newspapers appeared to have a greater proportion of citations discussing Gardasil as being poorly understood by science and contradictory statements about the vaccine than U.S. newspapers. These two fright factors can be linked in that contradictory statements about Gardasil were often in relation to its scientific merit. U.S. newspapers contributed a greater proportion of citations under fear of man-made sources and references under this fright factor were often in the context of discussion and rejection of school based mandatory vaccination programs. Canadian newspapers reflected debate about the merits of Gardasil as a vaccine and questioned the balance of benefits to risks; U.S. newspapers reflected debate about the suitability of mandates from social and rights perspectives. This difference in the discussion of the HPV vaccine may be related to social orientation differences between Canada and the U.S.: “individualists” tend to be dismissive of risk claims, while “egalitarians” tend to be receptive towards them (Kahan & Braman, 2006).

Differences in emergent themes suggest variation in the focus placed on certain political issues. As time progressed after FDA approval, the concern of pharmaceutical industry lobbying of legislators was prominent in U.S. newspapers and eventually shifted the

focus away from the benefits of the HPV vaccine. The consequences of this political action of pharmaceutical lobbying on the dissemination and discussion of the HPV vaccine were reiterated in research and opinion papers on the topic (Haber, Malow, & Zimet, 2007; Wynia, 2007). Concern over changes in sexuality and promiscuity tended to be more prominent in Canadian newspapers due to responses to school based vaccination programs from Catholic school boards in Ontario. These examples indicate the focus on certain risks or fears may reflect social concerns in the public arena in each country.

Assessing the progressively negative emotional tone of article coverage of the HPV vaccine in both Canada and the U.S. suggests that valence could impede or influence understanding and potentially uptake of the vaccine. Earlier articles described the vaccine as “100% effective” which contrasted with later articles that reported accounts of adverse events and concerns of long term safety. Detailed discussion or criticism of vaccine policies and methods of implementation were largely absent in earlier news coverage, but dominated later newspaper coverage. News coverage on the Rotavirus vaccine from 1987 to 1999 indicated a similar trend of “early idealization—sudden condemnation” in reporting, and indicated that changes in reporting coincided with either scientific information or public health action (Danovaro-Holliday, Wood, & LeBaron, 2002). Considering the impact of the HPV vaccine on women’s health, the use of negative tone is particularly concerning. Gender differences in processing negative news may lead to avoidance or to less attention by women to negatively valenced stories than to more positively valenced stories (Grabe & Kamhawi, 2006). Messages that contain a fear component are only beneficial if followed by a strong efficacy message (Witte & Allen, 2000). The propagation of fear through fright factors about HPV and cervical cancer coupled with negatively valenced reporting about the HPV vaccine may

contribute to denial, defensive avoidance or reactance towards the fear. This may result in an individual's inability to process the information effectively and lack of confidence in the HPV vaccine to alleviate the fear brought about by HPV and cervical cancer.

The readability of articles in newspapers from both countries was clearly at a very high level, was well beyond that which could be easily understood by the general public, and could be categorized as inadequate (higher than Grade 8) (Doak, Doak, & Root, 1996). National literacy levels in Canada and the U.S. are measured across multiple domains including prose literacy which is defined as the knowledge and skills required to comprehend and use information from text (ALL, 2005); this competency would include use and comprehension of news stories. Level 3 represents the minimum level of ability needed to cope with demands of everyday life and is the level of skill needed for secondary school completion. In 2003, over 80% of Canadians aged 16 to 65 were estimated to be at Level 3 or lower; 2003 estimates in the U.S. indicate approximately 87% of Americans were at or below Level 3 (ALL, 2005). Average readability levels of news stories in Canadian and U.S. newspaper articles evaluated in our study suggest the need for post-secondary education to fully comprehend the text. High readability scores affect the degree to which the public can understand health information, and ultimately influence their ability to make an informed choice (Lunin, 1987). This may be particularly important during a time when policies could have a direct affect on segments of the population who may not have fully grasped all aspects of the issue but are forced to either make a choice or resort to avoidance. Combined with women's tendency to avoid negative news, lack of understanding due to high readability may further impede women's abilities and willingness to make an informed choice about the HPV vaccine.

This study had several limitations. First, the results and conclusions inferred from this content analysis are limited to a select number of high circulating U.S. and Canadian newspapers and may not reflect newspaper coverage at state, provincial, municipal and local levels. Nevertheless, given the widespread reach and influence of these national newspapers and the public health significance of the topic, national news media are likely to mirror the overall coverage of the issue in local news media (Demers, Craff, Choi, & Beth, 1989). Moreover, other forms of non-print media, such as televisions and radio, were not analyzed. A second limitation was that the data set was limited to the specified time period (January 2006-December 2007) and selected media outlets. It is possible that coverage after December 2007 would have fewer fright factors or less negative valence. This could be due to less emphasis being placed on HPV and cervical cancer in news stories. Limiting the study to the selected time period and newspaper outlets may have contributed to a smaller sample size and an inability to detect significant differences (for example in country specific citations about HPV). A third limitation was that themes were categorized using Bennett's checklist and typology of fright factors and this resulted in a content analysis specific to these categories. Alternate typologies or methods of analysis may have resulted in different categories and results. A fourth limitation was that the results obtained through this study were not intended to be reflective of past or current risk perceptions towards HPV, cervical cancer and the HPV vaccine, and may not reflect current reporting on the topic. A fifth limitation was that newspaper readers typically have higher income and education levels than the average population (Newspaper Association of America 2007); thus, the newspaper audience may exclude lower income women and their daughters who may be most at risk of cervical cancer. Finally, media reporting of risk messages about the HPV vaccine does not capture actual

uptake of Gardasil by women; clearly, other studies would be needed to measure the behavioural impact of risk messages in the print media.

2.7 Public Health Implications and Conclusions

The findings in this study suggest that some factors that elicit fear about HPV, cervical cancer and the HPV vaccine were common to both Canada and the U.S., while the frequencies of others may have varied based on the cultural and political environments. Bilateral (shared or more universal) factors include the impact of health beliefs about vaccines and the dread or fear associated with cancer and STI's, whereas culturally specific factors could include health care funding and delivery and societal norms that influence reactions to policy. These findings also demonstrate that communicating health risk information in the mass media is not separate from social and political contexts and that health communication efforts may be overshadowed by negative media coverage. By identifying the facets of a particular health issue that are prone to cause alarm and worry, and by acknowledging the role media outlets play in heightening that reaction, public health practitioners and policy makers can steer communication towards attenuating reactions to fear and misperceptions. This can ensure that women have the necessary information and resources to make an informed choice about the HPV vaccine based on clear and unbiased risk communication that empowers them to take charge of their health.

CHAPTER 3: Additional Variables Examined in Canadian and U.S. National Newspapers

In addition to fright factors, valence and readability of newspaper articles, the sources of information cited by article authors and the gender of the author in relation to article valence were also examined. The information presented in this chapter supplements the findings discussed in Chapter 2.

3.1 Rationale

Sources of information are important because messages are evaluated by the receiver not only by their content, but by where the information was obtained from as well (Bennett, 1999; Smith, Bauman, Mckenzie, & Thomas, 2003). These sources can be judged based on their credibility and trustworthiness. Government and industry have experienced a decline in public confidence, while citizen groups have gained public trust (Covello & Peters, 1996). The prevalence of government and pharmaceutical industry sources in conjunction with fear inducing risk messages could serve to heighten the anxiety about the HPV vaccine. The use of sources of information that are not trusted by the public may result in people dismissing the risk claims made by those sources, further skewing the presentation of information about HPV, cervical cancer and the HPV vaccine.

Gender of the reporter was included because cervical cancer and the Gardasil vaccine may be seen as a women's health issue. Female reporters may have a greater vested interest in this topic, or gender may be a lens through which "feminine or masculine" social perspectives colour the tone of the articles (Rodgers & Thorson, 2003). Variations between males and females in reporting were attributed to socialization, and/or the ways in which males and females learn to carry out their jobs in the workplace. Distinctions in social perspectives are based on differing ways of learning and processing information with the aim of adjusting to societal roles. Differences in the tone of news stories between males and females reporters were observed. Female reporters tended to write more positive stories, although the size of the newspaper organization had an affect on the relationship between gender and tone. Larger newspaper organizations and ratio of male to female reporters had a diminishing effect on the relationship (Rodgers & Thorson, 2003).

3.2 Methods

The categories used to code for sources of information were: government (federal, provincial/state, municipal/local), health (federal health bodies, health associations and authorities), research (personnel, scientific studies), other (health professionals, individuals, advocacy groups), and pharmaceutical company. The number of times each source was cited was tallied for each country, with each source being coded only once even if it appeared multiple times within each article. The gender of the reporter was identified based on author names. Non gender-specific names or articles with multiple authors were classified as "unidentified". Chi-Square tests were performed to assess the association between country

and sources of information. Additional Chi-Square test were performed to examine the relationship between gender of the reporter (if identified by name in the news story), and the emotional tone (valence) within and across Canadian and U.S. newspaper articles.

3.3 Results

3.3.1 Sources of Information

Tallies for the sources of information appear in **Table 3.1**. A statistically significant difference was found in the sources of information cited by Canadian and U.S. articles (Chi-Square: 22.38, $df = 4$, $p < 0.05$). The most notable difference was found in the number of sources of information attributed to pharmaceutical company representatives or to the studies that these companies fund, which tended to appear more in U.S. newspaper articles than in Canadian articles. Health sources (particularly health associations) were cited less frequently in the U.S. articles than in the Canadian articles. Although the overall percent of sources coded in the “Other” category did not vary between Canada and the U.S. (16% and 19%, respectively), the distribution of sources under this category varied between Canada and the U.S.; Canadian newspaper articles had a greater proportion of lay individuals sharing their experiences, while U.S. newspapers tended to cite health professionals and advocacy group as sources of information more often. Examples of sources of information coded under each category for Canada and the U.S. appear in **Table 3.2**.

Table 3.1: Citations (number [%]) for sources of information in Canadian and U.S. newspaper articles about HPV, cervical cancer and the HPV vaccine.

Source	Canada (%)	U.S.(%)
Health	131 (54)	86 (35)
Federal Association/Authority	53 78	61 25
Government	29 (12)	36 (15)
Federal Provincial/State Municipal/Local	8 21 0	0 31 5
Research	34 (14)	45 (19)
Personnel/Institutions Scientific Studies	19 15	27 18
Pharmaceutical Company	10 (4)	30 (12)
Other	38 (16)	46 (19)
Health Professionals Individuals Advocacy Groups Other	6 12 6 14	15 5 19 6

Table 3.2: Examples of the sources of information about HPV, cervical cancer and the HPV vaccine in Canadian and U.S. newspaper articles.

Source	Canada	U.S.
Health Federal Association/Authority	Health Canada Canadian Cancer Society	FDA American Academy of Pediatrics
Government Federal Provincial/State Municipal/Local	Government of Canada Premiers Regional Representatives	U.S. Government Governors City Representatives
Research Personnel/Institutions Scientific Studies	Universities Clinical trials (with Merck affiliations stated)	Research centers Attitudes and beliefs about HPV vaccination
Pharmaceutical Company	Merck Frosst president	Merck spokesperson
Other Health Professionals Individuals Advocacy Groups Other	Doctors Named individuals Democracy Watch Halton Region Catholic School Board	Nurses Named Individuals Women in Government Focus on the Family (Conservative Christian group)

3.3.2 Gender of Reporter

There were no differences in the frequency of news coverage on HPV, cervical cancer and the HPV vaccine by gender of the reporter for articles published in Canadian newspapers (30% male; 44% female; 25% unidentified) and U.S. newspapers (40% male; 33% female; 27% unidentified). There were also no differences in the valence of the articles between male and female reporters in either country.

3.4 Discussion

Examining sources of information in Canadian and U.S. national newspapers revealed significant overall differences in the frequency of the sources of information that were cited within the newspaper articles. Differences in the sources of information used could reflect differences in the coverage of fright factors and the amplification of certain emergent themes. More references to pharmaceutical companies as sources of information in U.S. articles may mirror the amplification of pharmaceutical lobbying in the U.S. media reports. Repeatedly using an industry source viewed as having profit as its main goal propagates a level of distrust by the public; such distrust could become associated with the vaccine itself and eventually block the receptivity of any information from that source (Covello & Peters, 1996).

The frequencies of cited sources of information in Canadian and U.S. newspaper articles were concordant with the results obtained from examining the fright factors. The greater presence of individual stories under the “other” category in Canadian newspaper articles may reflect a focus on the effect of cervical cancer and the HPV vaccine on “identifiable victims”. The higher prevalence of individuals relaying their experiences

reinforces Canada's "solidaristic" worldview and presents more personalized positive or negative individual experiences with HPV and cervical cancer diagnoses or treatment, or with receiving the HPV vaccination. Inclusion of a greater number of health associations in the Canadian newspaper articles also reflects the primary debate being more focused on the merits of Gardasil as an HPV vaccine, rather than the more dominant debate about the use of mandates in the U.S. newspaper articles.

Analysis of trustworthiness of sources of risk information about genetically modified foods, climate changes, and human genetics in the U.K. showed that expert scientists from consumer and environmental organizations and universities were trusted the most in the communication of risk (Pidgeon, Langford, Poortinga, & O'Riordan, 2003). Governments and industries associated with the specific risk were the least trusted. In addition, government policy decisions were viewed with skepticism due to perceptions of government by the public as distorting facts in its favour and being too influenced by industry (Pidgeon et al., 2003). Lack of trust in government and industry may indicate that health associations which recommend the use of vaccines such as Gardasil may be a more effective primary source of information which is needed to gain public trust.

The lack of differences in article tone or valence due to the gender of the reporter may reflect the size of the newspaper organizations included in this study. Gender differences in tone or valence based on socialization of female reporters were found to disappear in large newspaper organizations compared to smaller, local organizations (for example, female reporters were more likely to write positive stories than male reporters, but a mediating effect was observed when examining the findings in relation to newspaper size) (Rodgers & Thorson, 2003). The harmonization of perspective or tone between male and female reporters

was attributed to the expectation that female reporters would conform to the reporting norms and perspectives of a male-dominated industry in order to succeed in large and influential news organizations.

The selection of highly-circulated national newspapers may contribute to the lack of differences observed in reporting about the HPV vaccine between male and female reporters. Examining valence of news stories in relation to reporter gender in smaller or local newspapers may result in a different conclusion. In addition, the size of newspaper may influence how a story is covered. Differences in reporting about cancer were observed in examining small and large newspapers in Ontario (newspaper size was based on circulation rates and size of population served by the newspaper outlet) (MacDonald & Hoffman-Goetz, 2001). Larger newspapers were more likely to use wire services, which tend to be more informative and accurate. Smaller newspapers included more human interest stories. Informative news stories may contain less positively or negatively valenced references about the HPV vaccine compared to human interest stories which may include opinions and descriptions of personal experiences that add a positive or negative tone to the article. It would be expected that differences in valence of articles as a function of gender of the reporter would have a more evident impact in small newspaper organizations or in specialty newspapers targeting women. However this relationship remains to be tested empirically for news stories about HPV, cervical cancer and the HPV vaccine.

Assessing sources of information and the effect of reporter gender on article valence provide an added layer through which the presentation of risk in national newspapers can be evaluated. While the reporting of fright factor was the primary finding of this study, source trustworthiness can affect how information that contains fear-inducing messages is interpreted

or received by newspaper readers. And although article tone or valence was not associated with the gender of the reporter for this data set, differences in the presentation of risk information may be found in smaller newspaper outlets.

CHAPTER 4: Risk Messages about HPV, Cervical Cancer and the HPV Vaccine

Gardasil in North American News Magazines

4.1 Research Question

The purpose of this study was to evaluate the types of risk messages that produce or heighten fear in reporting about HPV, cervical cancer and the HPV vaccine in Canadian and U.S. high-circulating news magazines articles published shortly before and after the HPV vaccine was approved and implemented into policy.

4.2 Rationale

The mass media can amplify the public perception of risks of the HPV vaccine as individuals often acquire health information about risk from the media (Bennett, 1999). While newspapers surpass magazines as a source of news, coverage of issues by popular magazines also affects general public perceptions (State of the News Media, 2007). Ensuring the presence of accurate risk information about HPV in magazines is crucial due to their possible use as a source of information, such as by HPV positive women (McCree, Sharpe, Brandt, & Robertson, 2006). Understanding the types of risk messages in the media can aid

public health officials and educators address gaps in news coverage and alleviate any possible fear or concern caused by the presentation of fear inducing risk messages in news magazines.

4.3 Methods

4.3.1 Sample Selection and Data Sources

To assess news coverage of the Human Papillomavirus (HPV) vaccine (Gardasil) magazine stories published from January 2006 to December 2007 found through the online databases LexisNexis Academic and Factiva were retrieved. The study focused on the top two circulating news magazines in Canada and the United States: *Maclean's* (average Canadian circulation: 356, 165), *Time Canada* (average Canadian circulation: 234,451), *Newsweek* (average U.S. circulation: 3,124,059) and *Time* (average U.S. circulation: 3,351,872). Circulation rates were obtained from the Audit Bureau of Circulations based on circulation averages for six months ending in 2007 (ABC, 2008).

To assess the discussion of HPV and cervical cancer in the context of the vaccine articles that mentioned HPV, cervical cancer and the HPV vaccine in the search of magazine coverage were included. The two databases were searched using the search string “(HPV OR human papillomavirus) AND cervical cancer AND (Gardasil OR vaccine)” in the title or text, with a date range from 01/01/2006-12/31/2007, and limited to the four magazines. This time period was chosen to identify articles published shortly before or after approval of Gardasil by the FDA in June, 2006 and by Health Canada in July, 2006. The time period also included reporting about the release of HPV vaccine recommendations by federal advisory boards from

committees at the Public Health Agency of Canada in February 2007 and the Centre for Disease Control in March 2007. The search of LexisNexis and Factiva resulted in 19 articles (10 Canadian and 9 U.S. articles) from the four magazines. Articles were included if all three keywords (HPV, cervical cancer, Gardasil or HPV vaccine) appeared at least once in the article. After the full text was received, articles not appropriate to the study were excluded (such as those that did not refer to all three keywords). Reviewing the articles published in *Time* and *Time Canada* revealed that identical articles were published in both magazines (2 unique to one magazine; 4 duplicates). Duplicate stories were coded only once under a “Both” category (for country of origin).

4.3.2 Data Coding Process

A directed content analysis approach was used to develop the coding instrument (Hsieh & Shannon, 2005). Initial coding was based on Bennett’s checklist of fright factors which affect public perception of risk (Bennett, 1999). These fright factors, which potentially trigger alarm, fear, and anxiety, are: involuntary, inequitably distributed, inescapable by taking personal precautions, resulting from an unfamiliar or novel source, result from man-made sources, causing hidden or irreversible damage, pose particular danger to small children, pregnant women, or future generations, threaten a form or death, illness or injury arousing dread, damaging identifiable victims, poorly understood by science, and subject to contradictory statements from responsible sources. These fright factors were used throughout coding, as they applied to HPV, cervical cancer and the HPV vaccine. New emergent themes (as relevant to fright factors) were coded as they occurred in the text within a category identified as “Other”. These emergent themes were pharmaceutical lobbying, promiscuity

and changes in sexuality, and the effect of the vaccine on screening practices. Any discrepancies in coding between two researchers were discussed until final consensus was reached.

4.3.4 Data Analysis

Articles were coded manually and the text and codes entered in NVivo software (QSR International, NVivo 7) which allows the user to arrange coding categories into hierarchical “tree nodes”. For this analysis, the tree nodes were “HPV”, “Cervical Cancer” and “HPV vaccine”, with the fright factors as the sub-nodes. The “Other” category was also coded as a hierarchical tree node and emergent themes as the sub-nodes. After coding was complete and reviewed, the number of times each sub-node was coded in the article text was obtained.

4.4 RESULTS

4.4.1 Magazine Coverage

There were 15 articles on the HPV vaccine from the four magazines from January 1, 2006 – December 31, 2007 that met the inclusion criteria. Six were from Canadian magazines (5 from *Maclean's* and 1 from *Time Canada*), and 5 were from U.S. magazines (4 from *Newsweek* and 1 from *Time Magazine*); four articles were published in both *Time* and *Time Canada*.

4.4.2 Coverage by Fright Factor

The number of citations and type of fright factors were coded separately for HPV, cervical cancer, and the HPV vaccine. The citation totals for each fright factor are shown in **Table 4.1**. There were more fright factors associated with HPV (49) and the HPV vaccine (43). There were fewer fright factor citations identified for cervical cancer (20).

Table 4.1: Number and percent of fright factor citations in Canadian and U.S. news magazine stories about HPV, cervical cancer and the HPV vaccine.

Fright Factor	Both	Canada	U.S.	Total (%)
HPV (total number of citations)	9	25	15	49
threaten death/illness/injury	6	9	4	19 (39)
inescapable	3	9	4	16 (33)
hidden and irreversible damage	0	7	7	14 (28)
Cervical Cancer (total number of citations)	2	10	8	20
threaten death/illness/injury	1	5	5	11 (55)
inequitably distributed	1	1	2	4 (20)
inescapable	0	2	0	2 (10)
damage identifiable victims	0	1	1	2 (10)
subject to contradictory statements	0	1	0	1 (5)
HPV Vaccine (total number of citations)	5	33	5	43
poorly understood by science	2	11	1	14 (33)
result from man-made sources	0	8	2	10 (23)
inequitably distributed	3	4	1	8 (19)
pose danger to small children	0	5	0	5 (12)
subject to contradictory statements	0	4	1	5 (12)
damage identifiable victims	0	1	0	1 (2)
Other Themes (total number of citations)	4	9	3	16
promiscuity & changes in sexuality	3	2	2	7 (44)
effects on screening	0	5	1	6 (38)
pharmaceutical lobbying	1	2	0	3 (19)

The fright factor cited most often with respect to HPV was that of threatening, death, illness or injury; HPV infection as being inescapable was also raised often in the news articles. The following are examples of HPV fright factors in the Canadian and U.S. news magazine articles:

HPV fright factor: threatening death, illness or injury

CANADA: “Gardasil focuses on two strains (16 and 18) that account for 70 per cent of cervical cancer cases and two others that cause genital warts...” Maclean’s (August, 2007)

U.S.: “The vaccine, called Gardasil, immunizes against four of the most prevalent strains of the human papillomavirus (HPV), the most common sexually transmitted infection and the cause of 70% of cervical-cancer cases.” Time (December, 2006)

BOTH: “Almost all cervical cancers are caused by a few strains of a sexually transmitted microbe called human papillomavirus, or HPV.” Time and Time Canada (June, 2006)

HPV fright factor: inescapable

CANADA: “The key to the vaccine's effectiveness lies in administering it before a person is sexually active and therefore at risk of contracting HPV, which can even spread via skin-to-skin contact.” Maclean’s (October, 2006)

U.S.: “HPV is one of the most common sexually transmitted infections on the planet-- as many as 80 percent of women will be exposed to it at some point in their lives.” Newsweek (May, 2006)

BOTH: “About 40% of girls become infected with **HPV** within two years of becoming sexually active. By age 50, 80% of women have had the virus at some point.” Time and Time Canada (March, 2007)

Similar to HPV, the fright factor identified most often for cervical cancer was that of threatening, death, illness or injury. The inequitable distribution of cervical cancer was also frequently mentioned. Examples of these two fright factors about cervical cancer from the news magazines are given below:

Cervical cancer fright factor: threatening death, illness or injury

CANADA: “According to the Canadian Cancer Society and Cancer Care Ontario, cervical cancer is the second most common cancer in women aged 35 to 49, and the third most common cancer for women aged 20 to 34.” Maclean’s (September, 2007)

U.S.: “But untreated [cervical cancer] in its advanced stages, it is a painful, gruesome and formidable enemy.” Newsweek (May, 2006)

BOTH: “...cervical cancer, which strikes about 500,000 women worldwide a year.” Time & Time Canada (March, 2007)

Cervical cancer fright factor: inequitably distributed

CANADA: “...the current push for young girls to be immunized largely ignores the group of women most affected [by cervical cancer]: immigrants, refugees, Aboriginals, the disabled, poor and those living in remote regions...” Maclean’s (August, 2007)

U.S.: “Vaccination cannot, however, save the lives of women who have already developed cervical cancer, which strikes particularly hard in South Asia, Latin America and sub-Saharan Africa.” Newsweek (May, 2006)

BOTH: “The price tag alone probably puts it out of reach for many uninsured women in the U.S....not to mention millions of poor women in the developing world, where cervical cancer is a leading cause of death.” Time and Time Canada (June, 2006)

Across all categories, the single fright factor with the most citations was for the HPV vaccine as being poorly understood by science. Surprisingly, most of the citations (79%) came from the two Canadian magazines. This was followed by the threat of the vaccine Gardasil as resulting from man-made sources. Examples of quotes of these two fright factors about the HPV vaccine in the news magazines are given below:

HPV vaccine fright factor: poorly understood by science

CANADA: “All these questions and caveats highlight just how little medical and scientific evidence exists to make the case against mass inoculation a no-brainer.” Maclean’s (August, 2007)

U.S.: “Nobody knows exactly how long the vaccines will be effective and when, or if, boosters will be needed.” Newsweek (May, 2008)

BOTH: “As with any new vaccine, there are plenty of unknowns about Gardasil.” Time & Time Canada (March, 2007)

HPV vaccine fright factor: results from man-made sources

CANADA: “...*really bad* reactions have been reported, including seizures, paralysis--and worst of all, three deaths...” Maclean’s (August, 2007)

U.S.: “Even medical organizations such as the American Academy of Pediatrics agree it's too early to mandate a vaccine approved just last June.” Newsweek (February, 2007)

Coding for emergent themes revealed an emphasis on promiscuity and changes in sexuality with respect to the vaccine as well as a discussion about screening. These two highly cited fright factors are represented by the following:

Promiscuity and changes in sexuality due to HPV vaccination

CANADA: “Some say a new cancer-fighting vaccine may encourage promiscuity.” Maclean’s (October, 2006)

U.S.: “Conservative opponents argue that making an inoculation for an STD mandatory may encourage premarital sex and violates parental rights.” Newsweek (February, 2007)

BOTH: “Religious and parent groups, however, are concerned that Gardasil may encourage sex by promoting the idea that it's risk-free...” Time and Time Canada (March, 2006)

Effects on screening due to HPV vaccination

CANADA: “The annual Pap should not be compromised by the substitution of a vaccine's promise, effective or not.” Maclean’s (September, 2007)

U.S.: “Some health advocates were also worried that women might see the vaccine as a substitute for yearly screenings like Pap smears.” Time (December, 2006)

4.5 DISCUSSION

The directed content analysis of high circulating Canadian and U.S. news magazines indicates fear-inducing risk messages about HPV, cervical cancer and the HPV vaccine are frequently reported. Although this qualitative analysis is drawn from a relatively small sample of mass circulating news magazines, the most frequently cited fright factors for each category from magazine articles that are likely to be highly visible to the public (based on circulation rates) were identified.

Reporting of the threat induced by HPV was based on its “inescapable” nature and its ability to “threaten death, illness or injury”. Coding under these two fright factors was dominated by reports of the high prevalence rates and pathology of HPV infection. Studies examining news reports and women’s knowledge about HPV prior to the introduction of Gardasil found that accurate cancer risk information was often omitted and many women overestimated the risk of developing cervical cancer due to HPV infection (Anhang, Stryker, Wright, & Goldie, 2004; Anhang, Wright, & Smock, 2004). Heightened fear due to a high degree of reporting about the consequences and inescapability of HPV infection (also indicated by more fright factors associated with HPV than Gardasil or cervical cancer) without accurately explaining its connection to cervical cancer risk could present an incorrect or biased presentation of risk information to the public that may need to be rectified by health officials.

Similar to HPV, threatening death, illness or injury due to cervical cancer was also the most frequently identified fright factor in magazine articles. Reporting about cervical cancer’s “inequitable distribution” was mainly in the context of international inequities in countries without adequate screening resources and focused less on disparities in cervical

cancer mortality in Canada and the U.S. despite the presence of socioeconomic disparities in both countries) (Ng, Wilkins, Fung, & Berthelot, 2004). This finding may also be indicative of the higher socioeconomic status of magazine readers, who typically have higher incomes than the average population (State of the News Media, 2007).

Coverage of the HPV vaccine was dominated by reporting on Gardasil being poorly understood by science and its threat resulting from man-made sources (the latter mainly encompassed reports on adverse effects, followed by early mandates and implementation concerns). The prominence of fright factors that emphasize Gardasil as being poorly understood by science is of concern because it can affect beliefs about the benefits of immunization, which can in turn affect vaccine uptake (Zimet, Mays, & Fortenberry, 2000). The majority of the text coded under “resulting from man-made sources” originated from one article published in Canada’s *Maclean’s* magazine entitled “Our girls are not guinea pigs”, which vehemently opposed the mass use of Gardasil, recounted personal stories of short-term side effects and criticized the early implementation of the vaccine. Although this single article could contribute to a bias in coding for this fright factor, the article had a powerful impact in Canada and even attracted the attention of Canada’s Chief Public Health officer at the time, Dr. Butler-Jones, who issued a letter to counter the article describing it as “inappropriate and one-sided” (Butler-Jones, 2008). The need for a prominent public health official to be compelled to address the content of a news magazine article exemplifies the effect such news media outlets can have on public health issues.

Coding for emergent themes revealed the importance of social perspectives when discussing cancer prevention issues. For example, concern about changes in sexuality and promiscuity was slightly more prominent and more uniformly distributed across all magazines

than issues about Gardasil's impact on screening practices. However, the impact on screening practices is of greater concern to public health officials than is speculation about changes in sexual behaviour (Zimet, Mays, & Fortenberry, 2000). This provides an example of the amplification of certain risks or fears that are influenced by social and cultural concerns in the public arena and illustrates that media descriptions of health issues are not independent of values and culture (Kasperson, Renn, & Slovic, 1998).

Coding for concern over Gardasil's impact on screening practices was focused on the use of Pap smears which are credited for significantly reducing cervical cancer incidence, morbidity and mortality worldwide (where resources are available). Screening must continually be a priority in cervical cancer prevention due to the additional 30% of cervical cancers caused by serotypes not covered by the vaccine, the limited efficacy data available to date, and the lack of benefits from the vaccine for those already infected with certain HPV serotypes (Zimet, Shew, & Kahn, 2008). In addition, receiving vaccination may lead to a false sense of protection from all cervical cancers and other STI's which are also screened for and detected during routine Pap tests (Zimmerman, 2006). Stressing continued counseling and informing the public are the best measures in preventing cervical cancer and other diseases (Vetter & Geller, 2007). Based on Gardasil being marketed as a "cervical cancer vaccine" and the relatively low number of citations about the importance of Pap screening found in magazine articles included in this study, cancer educators may be faced with the challenge of continually presenting the HPV vaccine as one of many possible options or initiatives in the prevention of cervical cancer.

This study has several limitations. First, the results and conclusions inferred from this content analysis are limited to a select number of high circulating U.S. and Canadian

magazines and may not reflect specialized magazines tailored for specific audience demographics (such as women's magazines). While newspapers surpass magazines as a source of news, coverage of issues by popular magazines also affects general public perceptions (State of the News Media, 2007). Secondly, the data set was limited to the specified time period (January 2006-December 2007). It is possible that magazine coverage after December 2007 would have fewer or different fright factors due to less emphasis being placed on HPV and cervical cancer in news stories, and the familiarity of the HPV vaccine as a part of preventive health programs. A third limitation was that *a priori* fright factors were used based on Bennett's checklist; an alternate framework for categorizing risk may have resulted in different results and conclusions. Nevertheless, given the robustness of Bennett's checklist, the framework used was inclusive in describing fear-causing characteristics and well-suited for health related risks. A final limitation was that magazine readers are typically of higher income brackets than the general public and are typically older (State of the News Media, 2007) which means that the risk messages in this study would likely reach readers of higher socioeconomic status (i.e., those with lower risk for cervical cancer, greater access to health services, and resources to receive the vaccine). Public media targeting a different audience demographic may have resulted in different types and frequencies of emergent themes and fright factors.

4.6 Public Health Implications and Conclusion

The introduction of the HPV vaccine, Gardasil, is a major advancement in reducing women's risk for cervical cancer. However, the mass media can heighten public fear and anxiety and may neglect to focus on important issues that affect cancer prevention initiatives. This may result in misperceptions about the vaccine by the public. Cancer educators can help to ensure that women have the information and resources needed to make informed decisions about the HPV vaccine as part of a package of cervical cancer prevention strategies based on clear and unbiased risk communication.

CHAPTER 5: General Discussion

5.1 Key Findings

5.1.1 Fright Factors

The main findings of the two studies are that fright factors were frequently reported about HPV, cervical cancer and the HPV vaccine in North American newspapers and news magazines between January 2006 to December 2007. A directed content analysis of both mediums using Bennett's fright factors as a framework revealed some of the most frequently cited aspects of HPV, cervical cancer and the HPV vaccine that could induce fear or worry in the public.

The results from the content analysis examining Canadian and U.S. national newspapers confirmed the first hypothesis that types of fright factors cited in each country would be similar. Both Canadian and U.S. newspapers emphasized certain fright factors for each of HPV, cervical cancer and the HPV vaccine based on shared issues and concerns. A similar set of emergent themes were found for both countries as well. The second hypothesis predicted that there would be differences in the frequency of fright factors cited. This was confirmed for cervical cancer only; Canadian news stories focused on identifiable victims and the hidden and irreversible properties of cervical cancer while U.S. news stories focused on the inequitable distribution of cervical cancer. Differences in the discussion of cervical

cancer could be explained by differences in cultural perspectives and methods of health care delivery and funding. Both countries had the highest number of fright factor citations for HPV with an emphasis on aspects of HPV that threaten death, illness or injury, followed by an emphasis on HPV's high prevalence. While differences between countries in the presentation of fright factors about the HPV vaccine were not statistically significant, differences in the frequencies of certain fright factors reflected overarching differences in the discussion of the HPV vaccine. The primary reason for differences in the presentation of fright factors about the HPV vaccine was a focus on the scientific merit of Gardasil in Canadian articles and a focus on individual rights and the suitability of mandates in U.S. articles.

Examining news magazines also revealed a similar emphasis on types of fright factors about HPV, cervical cancer and the HPV vaccine in agreement with those found in newspapers. The analysis of North American news magazines articles for fright factors emphasized the threat of illness, death or injury from HPV and cervical cancer and indicated a lack of confidence in the HPV vaccine (mainly coded under poorly understood by science and as resulting from man-made sources). A letter issued by Canada's Chief Public Health Officer at the time in response to a magazine article that had a high frequency of fear-inducing messages about accounts of adverse events related to the HPV vaccine demonstrated the influence that fear-inducing messages in print media can have on public dialogue about HPV vaccinations. Proactive action from public health officials during a potential controversy could serve to reassure the public and attenuate feelings of concern or anxiety. Recommendations about how to alleviate reactions of mistrust and confusion by the public associated with the smallpox vaccinations (initially recommended due to the possibility of a

bioterrorism attack) included clear communications from prominent public health officials or organizations (Fischhoff, Gonzalez, Small, & Lerner, 2003)

5.1.2 Other Key Findings from Newspapers

This study also revealed other important findings about elements that affect the presentation of risk information, such as citing the pharmaceutical industry as sources of information. The use of pharmaceutical sources for print media information about the HPV vaccine could decrease the positive perception of the vaccine; this would likely arise because pharmaceutical companies are not trusted as reliable, honest and credible sources of information (Vetter & Geller, 2007). Most educational efforts to educate the public about Gardasil have been funded by the pharmaceutical company (Vetter & Geller, 2007; Hughes et al., 2009). Even if the information presented by the Merck & Co. is accurate, the public will be less inclined to believe information from a source that will financially benefit from mass immunizations using Gardasil. Future efforts to disseminate vaccine information may be more effective in gaining public trust if the sources of information do not have government or industry affiliations.

Findings about the progressively negative valence and high readability levels of newspapers articles about HPV, cervical cancer and the HPV vaccine indicate qualities of news coverage that could influence the public's understanding of the topic. The increase in negatively valenced stories may be of particular concern to women, who are generally less receptive to negative news (Grabe & Kamhawi, 2006). As with most of the literature assessing literacy and health-related communication (Friedman & Hoffman-Goetz, 2006; Shieh & Hosei, 2008) the readability level of the newspaper articles was too high for the

public. Although national newspapers and news magazines tend to have an audience with higher levels of education (State of the News Media, 2007) the average readability scores exceed the literacy levels of the majority of the population (ALL, 2005). The high readability level of news stories about the HPV vaccine may exacerbate the knowledge gap between different socioeconomic segments of the population (Tichnor, Donohue, & Olien, 1980). The disparities in cervical cancer risk (e.g., in women of low socio-economic status) may be exacerbated by media communications that lack clear language and do not take into account the literacy levels of the public (Viswanath, 2006).

5.2 Possible Impact of Print Media Reports on Health Beliefs about HPV, Cervical Cancer, and the HPV Vaccine

Research repeatedly indicates the importance of mass media in communicating to the public about health risks and health interventions. A number of studies have documented the inaccurate and incomplete information about health topics (e.g., Calloway, Jorgensen, Saraiya, & Tsui 2006; MacDonald & Hoffman-Goetz, 2002). Numerous researchers have demonstrated the impact of negative media coverage on vaccine uptake (e.g., Goodyear-Smith et al., 2007; Gangarosa et al., 1998; Ramsay et al., 2002). The research presented in this thesis indicated the presence of fear inducing risk messages and an amplification of certain issues in print media about HPV, cervical cancer and the HPV vaccine.

Studies exploring the attitudes and beliefs surrounding HPV prior to the introduction of HPV vaccine found that general knowledge by the public was lacking both about HPV and its link to the development of cervical cancer. Further, alarm and worry were elicited in women who acquired the knowledge obtained from education print material of the link

between HPV and cervical cancer (Friedman & Sheppard, 2007; Brown et al., 2007). The documentation of inaccurate information about HPV prior to vaccine approval (Anhang, Stryker, Wright, & Goldie, 2004), coupled with inaccurate information about cancer in print media (MacDonald & Hoffman-Goetz, 2002) suggests a potential gap where the media may have provided inaccurate information about HPV, cervical cancer and the HPV vaccine. The findings from this present study add to that research by suggesting that news reports could heighten fear about the HPV and cervical cancer. For example, the high volume of citations for HPV and cervical cancer characterized as threatening death, illness, or injury could affect women's health beliefs by influencing their perceptions of the possible severity or potential susceptibility to HPV infection, and, as a consequence, developing cervical cancer.

While most studies exploring attitudes towards the HPV vaccine prior to its roll-out and implementation described an overall positive reaction by the public towards the vaccine (Brewer & Fazekas, 2007; Ogilvie et al., 2007), potential barriers to vaccination were also expressed in connection to health beliefs. Vaccine acceptance and intention to vaccinate were increased by confidence in the benefits of immunization and vaccine efficacy; cost and concerns about vaccine safety were described by surveyed individuals as perceived barriers to vaccination (Brewer & Fazekas, 2007; Ogilvie et al., 2007). The findings in the research presented in this thesis suggest the presence of fear inducing messages about vaccine beliefs that could affect vaccine uptake. The most frequently cited fright factors about the HPV vaccine were in relation to confidence in the vaccine's safety and efficacy and concerns about its high cost (i.e., represented by coding under poorly understood by science, result from man-made sources, and inequitably distributed). In addition, the progressively negatively tone in articles describing the HPV vaccine could further shape public attitudes and beliefs about the

vaccine, leading to a lack of confidence in the vaccine. No published study to date has addressed the impact of print media reports on HPV vaccine uptake. However, evidence of the media's influence on uptake of other vaccines (Gangarosa et al., 1998; Goodyear-Smith et al., 2007) indicates a need for public health officials to address the presence of fright factors in reporting about the HPV vaccine. For example, Gangarosa and colleagues (1998) found that while there was a decrease in pertussis vaccine uptake that coincided with negative media coverage (mainly driven by anti-vaccine movements), this effect was not observed in areas where there were ongoing positive media campaigns promoting the vaccine. Addressing fear-inducing messages in print media can help in ensuring the availability of appropriate risk information for the public and support the success of public health based immunization programs.

Although there was no evidence that direct-to-consumer advertising (DTCA) contributed to differences in the volume of fright factors between Canadian and U.S. newspapers and news magazines, pharmaceutical advertising was the most frequently identified medium through which parents in a U.S. based study learned about the HPV vaccine (Hughes et al., 2009). This is troubling because television and print advertisements for drugs and pharmaceutical products have been shown to present inaccurate risk information, to be vague in describing medication benefits, to focus less on medication risks than benefits, and fail to present information about other risk reducing activities (Bell, Wilkes, & Kravitz, 2000; Kaphingst, DeJong, Rudd, & Daltroy, 2004; Mintzes, 2006).

DTCA, whether only discussing HPV and cervical cancer or only mentioning Gardasil with no risk information, could contribute to public awareness and knowledge of the vaccine in Canada as well. This would be likely due to the numerous and accessible U.S. networks

and varied interpretation of DTCA legislation in Canada (Mintzes, 2006). The restrictions of DTCA in Canada and regulation of DTCA in the U.S. are in place due to the restriction on the sale of prescription drugs, the rationale here is that physicians have the license to prescribe such drugs and are responsible for informing patients of the risks (Mintzes, 2006). However, physicians are targets of pharmaceutical advertising, such as in medical journals, and are not immune to the influence of pharmaceutical advertising on their prescribing decisions (Palmer, Timm, & Neumann, 2008; Mintzes et al., 2002). Individuals who read fear-inducing messages in news stories on HPV, cervical cancer and the HPV vaccine may have been already exposed to inaccurate or incomplete information derived from pharmaceutical advertising.

5.3 Print Media Influence on Processing of Health Risk Messages

The fear based messages about HPV and cervical cancer combined with the lack of confidence in the HPV vaccine (as indicated by coding under “poorly understood by science”) presents an unfavourable presentation of risk information to the public. Based on the principles of the Extended Parallel Processing Model (EPPM), a fear-based message or “fear appeal” is only effective if accompanied with an efficacy message (Witte & Allen, 2000). Individuals must have confidence in both the benefits of a suggested action and their abilities to carry out that suggested action in order to alleviate the actual danger (i.e., risk posed by HPV and cervical cancer). If individuals cannot alleviate the danger through action, they attempt to alleviate the fear (i.e., fear caused by HPV and cervical cancer) through denial, defensive avoidance, or reactance. Based on the findings of this study, fear inducing messages about HPV and cervical cancer are common place in newspaper and news magazine

articles; however, a lack of a confidence in the benefits of immunization may leave many individuals without a strategy to moderate the heightened awareness of the reported danger posed by HPV and cervical cancer.

5.4 Evidence of the Social Amplification of Risk

The emphasis on the potential effects that the HPV vaccine might have on changes in sexuality, promiscuity and sexually risky behaviors was an important finding of this study, especially when comparing the citations and reporting of the effects that the vaccine would have on screening and safe sex practices in both newspapers and news magazines. Reporting on topics that emphasize changes in sexuality and promiscuity may help to reinforce feelings of shame and references to infidelity that emerged during discussions of HPV amongst women prior to the introduction of the vaccine (Friedman & Sheppard, 2007; Brown et al., 2007). Associating feelings of embarrassment and unfaithfulness with HPV infection were also found to be barriers in openly communicating about HPV. These feelings could be impediments to receiving vaccination due to the acknowledgment of STI risk inferred from receiving a STI vaccine or the perception that receiving a STI vaccine condones socially unacceptable sexual behaviour (Zimet, Mays, & Fortenberry, 2000). Since STI vaccines in particular are subject to individual and parental beliefs and values around sexuality (Zimet et al., 2000), open dialogue about relevant risk information needs to be imparted without the influence of stigmatization or personal value judgments. Frank and candid dialogue can aid in ensuring that HPV vaccine awareness and education efforts are not hindered by socially imposed perceptions of HPV infection and vaccination.

The emphasis on changes in sexuality, rather than on the importance of cervical cancer screening practices, also exemplifies the amplification of certain perceived risks over actual empirical health information. Much of the published literature, including research and commentary, conveys an urgency about maintaining screening practices (Brewer & Fazekas, 2007; Brown et al., 2007; Olatunbosun, 2006; Lippman, Melnychuk, Shimmin, & Boscoe, 2007), but the importance of screening was not reflected in print media analyzed in this study. Cost-effectiveness analyses indicate that the use of the HPV vaccine, in conjunction with modified screening guidelines (such as increasing the number of years between Pap tests for some immunized individuals), leads to the greatest reduction of HPV burden while maintaining cost savings (Brisson, Van de Veldt, De Wals, & Boily, 2007). A lesser focus on established screening practices, compared to speculation on the influence of the HPV vaccine on changes in sexuality, indicates a need for public health officials and health professionals to stress the importance of screening practices. This could be implemented by framing the HPV vaccine as one option in the prevention of cervical cancer and HPV infection. A multimodal approach to disease prevention has been demonstrated to constitute good public health strategy. For instance, studies assessing news coverage about the use of tamoxifen and mammograms in breast cancer prevention and screening also showed that clear communications about screening practices and the recommendations for tamoxifen use at the time were essential to avoid public confusion about uses of the medication and the importance of continued screening practices for specific segments of the population (Poe, 1999; Schwartz & Woloshin, 2002).

Moriarty and Stryker (2008) found that U.S. newspaper coverage of highly preventable and detectable cancers (including cervical cancer) included few efficacy

messages (i.e. specific information about how to perform a healthy behaviour or avoid an unhealthy behaviour) and mobilizing information (i.e. a phone number or web address to obtain more information about a cancer topic). Emphasis on prevention and screening strategies in mass media is important because mass media can be influential in promoting the use of positive health services, such as immunization programs (Grilli, Ramsay, & Minozzi, 2005).

Chapter 6: Limitations, Future Directions and Concluding Comments

6.1 Limitations

There are limitations to the research findings presented in this thesis (in addition to those stated in Chapters 2 and 4, such as categorization using Bennett's fright factors and date restrictions). Other forms of non-print media, such as televisions and radio, were not analyzed. This narrows the audience to those who use print media as primary sources of information. Print media sources are generally used by individuals of higher socio-economic status, while television and radio broadcasts are primary sources of information among minorities and individuals of lower socio-economic status (Benjamin-Garner et al., 2002). Therefore, the data presented here were not indicative of media outlets that may be used by individuals most affected by HPV and cervical cancer and those most in need of vaccination.

Also, media reporting of risk messages about the HPV vaccine does not capture actual use of Gardasil by women. Other studies would be needed to measure the behavioural impact of risk messages in the print media by assessing the actual influence media reports have had on intentions to vaccinate. Comparing vaccine uptake with mass media reporting could include articles published in local newspapers which may provide a personalized or localized perspective on the effect of media on health behaviours.

The use of content analysis, the SMOG readability formula and valence coding are subject to limitations. Content analyses are summative and not explanatory (Krippendorff, 1980). Therefore, inferences are based on categorical data that may be interpreted differently by a newspaper or news magazine reader based on different combinations of fright factors in

one article or the personal relevance of certain information. Further, only one measure of readability was used; alternate methods may result in slightly lower readability scores because the SMOG formula adheres to stricter guidelines than other methods (Friedman & Hoffman-Goetz, 2006). SMOG assessments do not take into account design and visual elements, which can also affect comprehension (Doak, Doak, & Root, 1996). Valence can be subjective or may be interpreted differently by the reader. Coding for the present study was based on an overall percentage of positive to negatively valenced words. Therefore, a neutral article may contain several positive and negatively valenced words which may have different effects on the reader who may not interpret the article as being neutral.

The newspaper and news magazine outlets included in this study were chosen due to their high-visibility based on high circulation numbers (see Appendices A and B for newspaper and news magazine rankings, respectively). Although not all chosen print media outlets are ranked as the highest of all titles in each country, they were chosen based on their generic news focus and use of the English language. For example, in assessing newspapers the National Post is fifth in Canadian newspaper circulation rankings, but is preceded by two French language newspapers (Le Journal de Montreal and La Presse, Montreal) which were excluded from this study. News magazines were chosen also based on a more generic news format that was not marketed for specific audiences. Maclean's and Time Canada were ranked as 4th and 8th by circulation. However, both Maclean's and Time Canada were preceded by specialty magazines such as Chatelaine and Canadian Living, which are tailored to women over the age of 40 and largely focus on lifestyle topics (Rogers Publishing, 2009; Transcontinental Media, 2009). Both Newsweek and Time were defined as top-circulating news magazines in the U.S. (State of the News Media, 2007).

6.2 Directions for Future Research

Future directions for research could pursue a number of fronts. It would be interesting to determine how media reports influence public perceptions of risk through interviews with individuals who considered vaccination, as well as the parents of young girls. Such interviews would help to inform how influential media coverage was in the perceptions of the HPV vaccine and decisions to vaccinate or not. Another area for further research would be exploring media coverage after December 2007 to examine any changes in types or frequency of fright factors. Researchers who included a wider date range in media analyses have found that the volume and tone of coverage coincided with public health action or the release of research information. Examining changes in fright factor volume and valence or tone changes would uncover the changes in trend over time. Further content analyses of local newspapers or other types of magazines which target specific audience demographics, such as women or specific ethnicities, could provide evidence about differences or similarities in the presentation of risk information about HPV, cervical cancer and the HPV vaccine. Assessing the content and influence of Merck's television and print advertising campaign in shaping perceptions about HPV, cervical cancer and the HPV vaccine would also present a more complete picture of the types and sources of risk messages members of the public are exposed to on a daily basis.

6.3 Concluding Comments

The introduction of Gardasil is a substantial advancement in women's and sexual health. However, health communication efforts may have failed to convey this fact. Criticisms of the method and timing in which policies were implemented in both Canada and the U.S. deemed the HPV vaccination campaigns a "failure" due to a preoccupation with mandates and legislation rather than the vaccine itself, "sensationalist" media reporting, and an overall propagation of distrust due to the involvement of multiple stakeholders (Dyer, 2007; Haber, Malow, & Zimet, 2007; Wynia, 2007). The issues surrounding HPV, cervical cancer and Gardasil show the various layers and aspects of an issue that could induce fear and heighten anxiety in the public. These issues also illustrate how discussions about risks and health issues are not exclusive of politics and values; such factors which can ultimately play a role in the success or failure of health interventions and public policies. Frameworks, such as the one proposed by Bennett (1999), can be useful tools in helping health educators and public health officials address aspects of health issues that can cause alarm and worry before they are heightened by media outlets. Media outlets, such as newspapers and news magazines, are not intended to be health communication material; nonetheless, they are used by members of the public to gain health information. The influence and widespread reach of print media can be utilized by public health officials to responsibly communicate credible and appropriate information.

APPENDIX A: Newspaper Rankings by Circulation Rates for 2007

Top 10 Canadian Daily Newspaper Rankings by Circulation (Monday to Friday)**

Rank	Newspaper	Daily Circulation (M-F)
1	Toronto Star	436,694
2	The Globe and Mail	322,807
3	Le Journal de Montréal	267,404
4	La Presse, Montréal	204,545
5	National Post	203,781
6	The Toronto Sun	179,004
7	The Vancouver Sun	165,144
8	The Province, Vancouver	141,164
9	The Gazette, Montreal	138,827
10	Ottawa Citizen	129,631

Source: Canadian Newspaper Association (rankings based on data from ABC, 2007)

**Selected media outlets for thesis research only included the top ranked English language newspaper publications (see Chapter 6.1: Limitations, page 83).

Top 10 U.S. Daily Newspaper Rankings by Circulation (Monday to Friday)

Rank	Newspaper	Daily Circulation (M-F)
1	USA Today	2,278,022
2	The Wall Street Journal N/A	2,062,312
3	The New York Times	1,120,420
4	Los Angeles Times	815,723
5	The New York Post	724,748
6	The Daily News	718,174
7	Washington Post	699,130
8	Chicago Tribune	566,827
9	Houston Chronicle	503,114
10	Arizona Republic - Phoenix,AZ	433,731

Source: BurrellesLuce (rankings based on data from ABC, 2007)

APPENDIX B: News Magazine Rankings by Circulation Rates for 2007
Copy Total Copy Total Paid

Top 20 Canadian Consumer Magazines by Circulation**

Rank	Newspaper	Circulation
1	Readers Digest	948,019
2	Chatelaine	615,559
3	Canadian Living	516,824
4	Maclean's	371,562
5	Selection Reader's Digest	249,843
6	Canadian House & Home	248,378
7	TV Guide	241,885
8	Time Canada	234,018
9	Style at Home	231,023
10	Coup de Pouce	223,056
11	Canadian Geographic	218,342
12	Châteline	202,744
13	L'actualité	185,684
14	Flare	157,156
15	Canadian Gardening	152,821
16	Today's Parent	150,313
17	Good Times	143,023
18	Oxygen	141,949
19	Le Bel Age	137,237
20	LOULOU	132,600

Source: Masthead Online: CircWatch 2007 (rankings based on data from ABC, 2007)

**Selected media outlets for thesis research only included the top ranked English language news magazine publications (see Chapter 6.1: Limitations, page 83).

Top 20 U.S. Consumer Magazines by Circulation**

Rank	Newspaper	Circulation
1	AARP the Magazine	23,434,052
2	AARP Bulletin	22,840,177
3	Reader's Digest	10,094,281
4	Better Homes and Gardens	7,638,912
5	National Geographic	5,071,134
6	Good Housekeeping	4,741,353
7	Ladies Home Journal	4,169,444
8	Time	4,066,545
9	Woman's Day	4,027,113
10	Family Circle	3,953,651
11	People	3,750,548
12	AAA Westways	3,735,510
13	Prevention	3,346,530
14	TV Guide (U.S.)	3,281,316
15	Sports Illustrated	3,204,699
16	Newsweek	3,118,432
17	Playboy	3,001,723
18	Cosmopolitan	2,947,220
19	VIA	2,826,638
20	Southern Living	2,824,105

Source: BurrellesLuce (rankings based on data from ABC, 2007)

**Selected media outlets for thesis research only included the top ranked English language news magazine publications (see Chapter 6.1: Limitations, page 83).

APPENDIX C: Representative Fright Factor Coding

C3

National Post (f/k/a The Financial Post) (Canada)

March 20, 2006 Monday
Toronto Edition

Cancer vaccines set for release in Canada: 'Wonderful news'

BYLINE: Louise Dickson, CanWest News Service

SECTION: CANADA, Pg. A7

LENGTH: 311 words

DATELINE: VICTORIA

VICTORIA - New highly effective vaccines that protect women from multiple strains of the virus that cause cervical cancer may be available in Canada next year.

HPV-threaten death

Drug giants Merck and GlaxoSmithKline are confident they will have the approval of licensing authorities within a year for vaccines that target the human papilloma virus, or HPV, Dr. Bernard Duval told an infectious disease conference yesterday in Victoria.

"It's wonderful news that you're going to have a vaccine against a very frequent cancer and genital warts," said Dr. Duval, who is head of immunization for the National Institute of Public Health in Quebec. "It will improve the well-being of women who get HPV."

cervical cancer - inescapable

cervical cancer - threaten death

→ Cervical cancer is the second-most frequent cancer worldwide with a mortality rate of 50%, said Dr. Duval. In North America, screening programs have decreased cervical cancer by about 75%. Still, more than 400 Canadian women die of cervical cancer each year. HPV, which is spread through unprotected sex, causes 100% of all cases.

cervical cancer - threaten death

Making the HPV vaccine available raises the questions of how Canada should proceed with immunization, Dr. Duval told specialists attending the annual conference of the Association of Medical Microbiology and Infectious Diseases Canada and the Canadian Association for Clinical Microbiology and Infectious Diseases.

HPV - threaten death

HPV - inescapable

→ At some point in their lives, 70% of all sexually active women will contract the HPV infection. Most women and men clear the infection within a few weeks or months, said Dr. Duval.

In a relatively small number of people the virus will remain. People can have a persistent infection without any of the symptoms. In a small proportion, the disease will persist causing benign warts or cervical or vaginal cancer. Although rare, HPV can cause anal cancer in gay men with HIV, HPV can be transmitted through oral sex and cause cancer of the larynx.

HPV - threaten death

HPV - threaten death

HPV - threaten death

HPV - threaten death

LOAD-DATE: March 20, 2006
LANGUAGE: ENGLISH
DOCUMENT-TYPE: News
PUBLICATION-TYPE: Newspaper

**Study: Cervical cancer vaccine less effective in sexually active;
 Women who have had HPV won't get full benefit**

BYLINE: Rita Rubin
SECTION: LIFE; Pg. 9D
LENGTH: 519 words

A vaccine designed to prevent cervical cancer significantly cut the risk of precancerous changes in women who had not already been infected with the cancer-causing virus types targeted by the vaccine, a study reports today.

The Gardasil vaccine, which has been sold in the USA since last summer, was not as effective in women who had been infected with human papillomavirus (HPV) types 16 or 18, thought to cause 70% of cervical cancer cases.

HPV-inescapable

HPV is the most common sexually transmitted infection in the USA, so that finding suggests that sexually active women might not be getting their money's worth out of the vaccine, which also targets two other HPV types thought to cause 90% of genital warts cases.

"Just like any vaccine, it's not going to be effective in people who already have the disease," Emory obstetrician/gynecologist Kevin Ault says.

About 93% of the more than 12,000 women ages 15 to 26 who participated in the international study, published in The New England Journal of Medicine, were not virgins upon enrollment.

Before they received the vaccine or placebo, participants were checked to see whether they had ever been infected by any of the four HPV types targeted by the vaccine. Fewer than 1% had been infected by all four, but 27% had been infected by at least one. But the HPV test available in doctors' offices reveals only whether women are currently infected with any HPV type, not what type or whether they've been infected before.

"It's important that women understand if they're sexually active, there's a chance they won't receive full benefit from the vaccine," says University of Washington epidemiologist Laura Koutsky of the trial's study group, which followed women for three years.

More than 90% of HPV infections clear up on their own. Once that happens, Koutsky says, studies suggest most women are protected against those HPV types. Lasting infection with cancer-causing HPV types can lead to cervical cancer, which is expected to kill 3,670 women in the USA this year.

Gardasil is approved for girls and women ages 9 to 26. The Centers for Disease Control and Prevention recommends vaccinating girls at age 11 or 12, before most are sexually active. Many states are considering the controversial step of requiring HPV vaccination for girls entering sixth grade.

HPV vaccine poorly understood

University of California-San Francisco OB/GYN George Sawaya, co-author of an editorial accompanying Koutsky's study, says he's not sure what to tell sexually active patients who ask about the vaccine. "An easy answer is 'CDC recommends it,'" Sawaya says. "I've been very clear with my patients that it's hard for me to counsel them about risks and benefits."

It's not known what proportion of vaccine recipients were sexually active before receiving the three-shot regimen, which costs \$360. Jennifer Allen of Gardasil maker Merck says the company has not yet broken down recipients by age, which could serve as a marker for sexual activity.

HPV vaccine - inequitable

Allen says Merck does not yet know the total number of girls and women who have received the vaccine, but she says, 5 million doses were distributed from last June through March 31.

LOAD-DATE: May 10, 2007

**APPENDIX D: Representative NVivo Coding
(Fright Factors and Emergent Themes—Canada)**

Tree Nodes

Name	Sources	References
HPV	0	0
hidden and irreversible damage	3	31
inescapable by taking personal precautions	3	49
threatens a illness or injury	2	121
unfamiliar or novel source	3	9
Cervical Cancer	0	0
arise from unfamiliar or novel source	1	1
damage identifiable victims	2	15
hidden and irreversible damage	2	6
inequitably distributed	2	8
inescapable	3	8
subject to contradictory statements	1	2
threaten form of death, illness, or injury arou	3	76
Gardasil	0	0
damage indentifiable victims	1	2
inequitably distributed	3	56
poorly understood by science	3	63
pose danger to small children	2	17
result from man-made sources	2	28
subject to contradictory statements	3	19
effects on Paps, safe sex	1	15
pharma lobbying	1	21
promiscuity, young kids sexual behaviour	2	29

**APPENDIX E: Representative Statistical Output from SAS Data Analysis
(SMOG Readability)**

The TTEST Procedure

Statistics

Variable	country	N	Lower CL	Upper CL		Lower CL	Upper CL		Std Err
			Mean	Mean	Mean	Std Dev	Std Dev	Std Dev	
SMOG	C	79	14.378	14.642	14.907	1.0221	1.1821	1.4018	0.133
SMOG	U	85	14.824	15.157	15.49	1.3414	1.5436	1.8183	0.1674
SMOG	Diff (1-2)		-0.941	-0.514	-0.088	1.246	1.3814	1.5501	0.2159

T-Tests

Variable	Method	Variances	DF	t Value	Pr > t
SMOG	Pooled	Equal	162	-2.39	0.0183
SMOG	Satterthwaite	Unequal	156	-2.41	0.0173

Equality of Variances

Variable	Method	Num DF	Den DF	F Value	Pr > F
SMOG	Folded F	84	78	1.71	0.0179

APPENDIX F: Readability Scores

Canadian Newspaper SMOG Scores

Author Type	N	Average	95% CL	Min	Max
All Articles	79	14.64	14.38—14.90	11.46	17.49
News Services	23	14.33	13.94—14.72	12.17	16.16
Reporters and Opinions	56	14.77	14.44—15.10	11.46	17.49
Reporters Only	44	14.87	14.54—15.20	12.28	17.49
Opinions Only	12	14.39	13.42—15.36	11.46	16.54

U.S. Newspaper SMOG Scores

Author Type	N	Average	95% CL	Min	Max
All Articles	85	15.16	14.82—15.49	11.53	18.87
News Services	12	14.39	13.66—15.14	12.68	16.96
Reporters and Opinions	73	15.27	14.92—15.64	11.53	18.87
Reporters Only	63	15.25	14.87—15.63	11.53	18.87
Opinions Only	10	15.43	14.33—16.53	13.29	18.84

APPENDIX G: Sample Online SMOG Calculator

Article: Cervical Cancer Vaccine Hailed (National Post, July 19, 2006)

Output from: <http://www.wordscount.info/hw/smog.jsp> (Words Count, 2007)

Powered by SMOG Calculator - A Words Count Service

Detailed SMOG Analysis

SMOG Grade						
14.62	Words: 162	Polysyllable Words: 36	Numbers(off): 0	Total Tokens: 162	Syllables: 279	Sentences: 8

Basic Data

Sentences	8
Total Words	162
Polysyllable Words	36
Letters	786
Digits	0
Characters	971
Lines	1

Derived Data

Words/Sentence	20.25
Syllables/Word	1.72
Syllables/Sentence	34.88
Letters/Syllable	2.82
Letters/Word	4.85
Letters/Sentence	98.25

SMOG Grade	Educational Level	Example
0 - 6	low-literate	Soap Opera Weekly
7	junior high school	True Confessions
8	junior high school	Ladies Home Journal
9	some high school	Reader's Digest
10	some high school	Newsweek
11	some high school	Sports Illustrated
12	high school graduate	Time Magazine
13 - 15	some college	New York Times
16	university degree	Atlantic Monthly
17 - 18	post-graduate studies	Harvard Business Review
19+	post-graduate degree	IRS Code

SMOG Calculator - by Words Count

**Sample Article Used for SMOG Calculation:
CERVICAL CANCER VACCINE HAILED (National Post, July 19, 2006)**

Health Canada's approval of a new vaccine against a highly contagious sexually transmitted infection that causes cervical cancer is being called one of the most significant events of the last 100 years in the field of cancer control. "The things that we can do that would actually prevent a cancer, and thereby remove it as a cause of death, are very profound things," Dr. Simon Sutcliffe said yesterday, after Merck Frosst announced Health Canada approval of Gardasil for females aged nine to 26. Dr. Sutcliffe, inaugural chair of the Canadian Strategy for Cancer Control and president of the B.C. Cancer Agency, says the shots have the potential to rival radiation therapy for the treatment of cancer, or three-dimensional scans and MRI in the diagnosis and staging of tumours. The new vaccine, which will be available through doctors by the end of August, protects girls or women exposed to human papillomavirus (HPV), but it doesn't help those who already have it.

REFERENCES

- ALL. (2005). *Learning a living: First results of the adult literacy and life skills survey*. Retrieved April 30, 2009, from <http://www.statcan.gc.ca/cgi-bin/af-fdr.cgi?l=eng&loc=pdf/4200878-eng.pdf>
- Anhang, R., Stryker, J. E., Wright, T. C. Jr, & Goldie, S. J. (2004). News media coverage of human papillomavirus. *Cancer, 100*(2), 308-314.
- Anhang, R., Wright, T. C. Jr, & Smock, L. (2004). Women's desired information about human papillomavirus. *Cancer, 100*, 315-320.
- Audit Bureau of Circulations. (2008). Retrieved 07/07, 2008, from <http://www.accessabc.com>
- Baukus, R. (2004). DTC advertising. *Journal of Health Communication, 9*(6), 563-564.
- Bell R. A., Wilkes M. S., & Kravitz R. L. (2000). The educational value of consumer-targeted prescription drug print advertising. *J Fam Pract; 49*(12), 1092-1098
- Benjamin-Garner, R., Oakes, M., Meischke, H., Meshack, A., Stone, E. J., & Zapka, J. et al. Sociodemographic differences in exposure to health information. *Ethnicity and Disease, 12*, 124-135.
- Bennett, A., & Adams, O. (Eds.). (1993). *Looking north for health*. Washington D.C.: Jossey-Bass Inc.
- Bennett P. (1999). Understanding responses to risk: some basic findings. In: P. Bennett & K. Calman. (Eds.), *Risk Communication and Public Health*. (pp. 3-19). New York: Oxford University Press.
- Brewer, N. T., & Fazekas, K. I. (2007). Predictors of HPV vaccine acceptability: A theory informed, systematic review. *Preventive Medicine, 45*(2-3), 107-114.
- Brisson, M., Van de Velda, N., De Wals, P., & Boily, M. (2007). The potential cost-effectiveness of prophylactic human papillomavirus vaccines in Canada. *Vaccine, 25*, 5399-5408.
- Brown, L., Ritvo, P., Howlett, R., Cotterchio, M., Matthew, A., & Rosen, B., et al. (2007). Attitudes toward HPV testing: Interview findings from a random sample of women in Ontario, Canada. *Health Care for Women International, 28*(9), 782-798.
- BurrellesLuce. (2007). *Top 2007 Newspapers, Blogs and Consumer Magazines*. Retrieved May 10, 2009, from <http://www.burrellesluce.com/top100/>

Butler-Jones, D. (2007). *Canada's chief public health officer refutes maclean's article on HPV vaccine*. Retrieved June 15, 2008, from <http://www.phac-aspc.gc.ca/media/cpho-acsp/hpv-vaccine070817-eng.php>

Calloway, C., Jorgensen, C. M., Saraiya, M., & Tsui, J. (2006). A content analysis of news coverage of the HPV vaccine by U.S. newspapers, January 2002-June 2005. *Journal of Women's Health, 15*(7), 803-809.

Centre for Disease Control. (2007). *Genital HPV Infection - CDC Fact Sheet*. Retrieved February 5, 2008, from <http://www.cdc.gov/std/HPV/STDFact-HPV.htm>

Chartier, J., & Gabler, S. (2001). *Risk communication and government*. Retrieved July 10, 2008, from <http://www.inspection.gc.ca/english/corpaffr/publications/riscomm/riscomme.shtml>

Clifford, G., Franceschi, S., Diaz, M., Munoz, N., & Villa, L. L. (2006). Chapter 3: HPV type-distribution in women with and without cervical neoplastic diseases. *Vaccine, 24*(S3), S26-S34.

Colucci, R., Hyuniuk, W., & Savage, C. (2008). *HPV vaccination programs in Canada: Are we hitting the mark? Report Card on Cancer in Canada*. Retrieved January 11, 2009, from www.canceradvocacy.ca

Covello, V. T., & Peters, R. G. (1996). The determinants of trust and credibility in environmental risk communication: An empirical study. In: V. H. Sublet, V. T. Covello, & T. L. Tinker. (Eds.). *Scientific Uncertainty and its Influence on the Public Communication Process*. (p.33-630). Netherlands: Kluwer Academic Publishers.

Danovaro-Holliday, M. C., Wood, A. L., & LeBaron, C. W. (2002). Rotavirus vaccine and the news media, 1987-2001. *JAMA, 287*(11), 1455-1462.

Davidson, A. E., & Wallack, L. (2004). A content analysis of sexually transmitted diseases in the print news media. *Journal of Health Communication, 9*(2), 111-117.

Demers, D.P., Craff, D., Choi, Y., & Beth M. (1989). Issue obtrusiveness and the agenda-setting effects of national network news. *Communication Research, 16*, 793-812.

Department of Health (of the United Kingdom). (2003). *The Social Amplification of Risk: The Media and the Public*. Retrieved April 6, 2008, from <http://www.doh.gov.uk/risk/riskampl.htm>

Doak, C. C., Doak, L. G., & Root, J. H. (1996). *Teaching patients with low literacy skills* (2nd ed.). Philadelphia: J.B. Lippincott.

- Dutta-Bergman, M. J. (2005). Developing a profile of consumer intention to seek out additional information beyond a doctor: The role of communicative and motivation variables. *Health Communication, 17*(1), 1-16.
- Dyer, O. (2007). HPV vaccine campaign struggles. *National Review of Medicine, 4*(20).
- Evans, R., & Roos, N. P. (1999). What is right about the Canadian health care system? *The Milbank Quarterly, 77*(3), 393-9, 276.
- Fischhoff, B., Gonzalez, R. M., Small, D. A., & Lerner J. S. (2003). Evaluating the Success of Terror Risk Communication. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science, 1*(4), 255-258
- Frewer, L. (2004). The public and effective risk communication. *Toxicology Letters 149*, 391–397.
- Friedman, A. L., & Sheppard, H. (2007). Exploring the knowledge, attitudes, beliefs, and communication preferences of the general public regarding HPV: Findings from CDC focus group research and implications for practice. *Health Education & Behavior, 34*(3), 471-485.
- Friedman D.B. & Hoffman-Goetz, L. (2006). Cancer Information A Systematic Review of Readability and Comprehension Instruments Used for Print and Web-Based. *Health Education & Behavior, 33*(3), 352-373.
- Gangarosa, E. J., Galazka, A. M., Wolfe, C. R., Phillips, L. M., Gangarosa, R. E., Miller, E., et al. (1998). Impact of anti-vaccine movements on pertussis control: The untold story. *Lancet, 351*(9099), 356-361.
- Glanz, K., Rimer, B. K., & Lewis, F. M. (Eds.). (2002). *Health Behavior and Health Education* (3rd ed.). San Francisco: Jossey-Bass.
- Goodyear-Smith, F., Petousis-Harris, H., Vanlaar, C., Turner, N., & Ram, S. (2007). Immunization in the print media - perspectives presented by the press. *Journal of Health Communication, 12*(8), 759-770.
- Grabe, M. E., & Kamhawi, R. (2006). Hard wired for negative news? Gender differences in processing broadcast news. *Communication Research, 33*, 346-369
- Graig, L. A. (1999). *Health of nations: An international perspective on U.S. health care reform* (3rd ed.). Washington D.C.: Congressional Quarterly Inc.
- Grilli, R., Ramsay, C., & Minozzi, S. (2005). Mass media interventions: Systematic review. *Cochrane Database of Systematic Reviews, 1*, 1–27.
- Guillaume, L., & Bath, P. A. (2008). A content analysis of mass media sources in relation to the MMR vaccine scare. *Health Informatics Journal, 14*(4), 323-334.

- Haber, G., Malow, R. M., & Zimet, G. D. (2007). The HPV vaccine mandate controversy. *Journal of Pediatric and Adolescent Gynecology*, 20(6), 325-331.
- Hastings, H., Stead, M., & Webb, J. (2004) Fear Appeals in Social Marketing: Strategic and Ethical Reasons for Concern. *Psychology & Marketing*. 2(11), 961-986.
- Health Canada. (2007). *It's your health: Human papillomavirus (HPV)*. Retrieved February 5, 2008, from http://www.hc-sc.gc.ca/iyh-vsv/diseases-maladies/hpv-vph_e.html
- Herzog, T. J., & Wright, J. D. (2007). The impact of cervical cancer on quality of life--the components and means for management. *Gynecologic Oncology*, 107(3), 572-577.
- Hochbaum, G. M. (1958). *Public Participation in Medical Screening Programs: A Sociopsychological Study*. PHS publication no. 572. Washington, D.C.: Government Printing Office.
- Hoffman-Goetz L., & MacDonald M. (1999). Cancer coverage in mass-circulating Canadian women's magazines. *Canadian Journal of Public Health*, 90, 55-59.
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288.
- Hughes, J., Cates, J. R., Liddon, N., Smith, J. S., Gottlieb, S. L., & N. T. Brewer. (2009). Disparities in how parents are learning about the Human Papillomavirus vaccine. *Cancer Epidemiology Biomarkers & Prevention*, 18(2), 363-372.
- Janz, N. K., Champion, V. L., & Strecher, V., J. (2002). The health belief model. In: K. Glanz, B. K. Rimer, & F. M. Lewis. (Eds.), *Health Behavior and Health Education* (3rd ed.) (pp. 45-66). San Francisco: Jossey-Bass.
- Kahan, D. M., & Braman, D. (2006). Cultural Cognition and Public Policy. *Yale Law & Policy Review*, 24, 147-172.
- Kaphingst, K. A., DeJong, W., Rudd, R. E., & Daltroy, L. H. (2004). A content analysis of direct-to-consumer television prescription drug advertisements. *Journal of Health Communication*, 9(6), 515-528.
- Kaplan-Myrth, N., & Dollin, J. (2007). Cervical cancer awareness and HPV prevention in Canada. *Canadian Family Physician*, 53(4), 693-697.
- Kasperson R. E., Renn O., Slovic P., Brown H. S., Emel J., & Gobel R., et al. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis*, 8(2), 177-187.
- Krippendorff, K. (1980). *Content Analysis: An Introduction to its Methodology*. California: Sage Publications Inc.

- Langford, I. H. (2002). An existential approach to risk perception. *Risk Analysis*, 22(1), 101-120.
- Lippman, A., Melnychuk, R., Shimmin, C., & Boscoe, M. (2007). Human papillomavirus, vaccines and women's health: Questions and cautions. *CMAJ : Canadian Medical Association Journal*, 177(5), 484-487.
- Lunin, L.F. (1987). Where does the public get its health information? *Academic Medicine*, 63(10), 923-938.
- MacDonald, M. M., & Hoffman-Goetz, L. (2002). A retrospective study of the accuracy of cancer information in Ontario daily newspapers. *Canadian Journal of Public Health*, 93(2), 142-145.
- Maggino, T., Casadei, D., Panontin, E., Fadda, E., Zampieri, M. C., & Dona, M. A., et al. (2007). Impact of an HPV diagnosis on the quality of life in young women. *Gynecologic Oncology*, 107(S1), S175-9.
- MastHead Online. (2007). *Circ Watch 2007*. Retrieved May 10, 2009, from <http://www.mastheadonline.com/library/?cate=Q2lyY3VsYXRpb24=>
- McCree, D. H., Sharpe, P. A., Brandt, H. M., & Robertson, R. (2006). Preferences for sources of information about abnormal Pap tests and HPV in women tested for HPV. *Preventive Medicine*, 43, 165-170.
- McLaughlin, G. H. (1969). SMOG grading: A new readability formula. *Journal of Reading*, 12, 639-646.
- Meredith, L. S., Eisenman, D. P., Rhodes, H., Ryan, G., & Long, A. (2007). Trust influences response to public health messages during a bioterrorist event. *Journal of Health Communication*, 12(3), 217-232.
- Mintzes B., Barer M. L., Kravitz R. L., Kazanjian, A., Bassett, K., & Lexchin, J. et al. (2002). Influence of direct to consumer pharmaceutical advertising and patients' requests on prescribing decisions: Two site cross sectional survey. *BMJ*, 32, 278-279.
- Mintzes, B. (2006). *Direct-to-consumer advertising of prescription drugs in Canada: What are the public health implications?* Toronto, Ont.: Health Council of Canada.
- Moriarty, C. M. & Stryker J. E. (2008). Prevention and screening efficacy messages in newspaper accounts of cancer. *Health Education Research*, 23, 487-498.
- Moynihan, R., Bero, L., Ross-Degnan, D., Henry, D., Lee, K., & Watkins, J., et al. (2000). Coverage by the news media of the benefits and risks of medications. *The New England Journal of Medicine*, 342(22), 1645-1650.

- Nabi, R. L., Roskos-Ewoldsen, D., & Carpentier, F. D. (2008). Subjective knowledge and fear appeal effectiveness: Implications for message design. *Health Communication, 23*(2), 191-201.
- National Advisory Committee on Immunization. (2007). Statement on human papillomavirus vaccine. *Canada Communicable Disease Report (33)*.
- National Cancer Institute. (2008). *Human papillomavirus and cancer: Questions and answers*. Retrieved July 6th, 2008, from <http://www.cancer.gov/cancertopics/factsheet/Risk/HPV>
- Newspaper Association of America. *Audience Profiles*. Retrieved May 5, 2009, <http://www.naa.org/TrendsandNumbers/Audience-Profiles.aspx>
- Ng, E., Wilkins, R., Fung, M. F. K., & Berthelot, J. (2004). Cervical cancer mortality by neighbourhood income in urban Canada from 1971 to 1996. *CMAJ, 170*(10), 1545-1549.
- NHS. (2008). *Immunization Information*. Retrieved May 5, 2009, from <http://www.immunisation.nhs.uk/Vaccines/HPV>
- Niederdeppe, J., Frosch, D. L., & Hornik, R. C. (2008). Cancer news coverage and information seeking. *Journal of Health Communication, 13*(2), 181-199.
- NVivo 7. (2007). Qualitative data analysis software; QSR International Pty Ltd. Version 7.
- Ogilvie, G. S., Remple, V. P., Marra, F., McNeil S. A, Naus, M., & Pielak, K. L, et al. (2007). Parental intention to have daughters receive human papillomavirus vaccine. *Canadian Medical Association Journal, 177*(12), 1506-1512.
- Olatunbosun, O. (2006). Human papillomavirus vaccine, teen sex and politics. *The Journal of Family Planning and Reproductive Health Care, 32*(2), 74.
- Organization for Economic Cooperation and Development, Health at a Glance: OECD Indicators 2003 (Paris: OECD, 2004)
- Palmer, J. A., Timm, A. R., & Neumann, P. J. (2008). Drug company advertising in medical journals about the health-economic advantages of their products for 2000-2006 versus 1990-1999. *Journal of Managed Care Pharmacy, 14*(8), 749-755.
- Patented Medicine Prices Review Board. (2007). *Report on New Patented Drugs – Gardasil*. Retrieved July 25, 2008, from <http://www.pmprbcepmc.gc.ca/english/View.asp?x=924&mp=572>
- Pidgeon, N., Langford, I. H., Poortinga W., & O’Riordan, T. Public Perceptions of Risk, Science and Governace. *Science in Society (Economic and Social Research Council)*.

- Poe, A. (1999). Cancer prevention or drug promotion? Journalists mishandle the tamoxifen story. *International Journal of Health Services*, 29(3), 657-661.
- Ramsay, M. E., Yarwood, J., Lewis, D., Campbell, H., & White, J. M. (2002). Parental confidence in measles, mumps and rubella vaccine: Evidence from vaccine coverage and attitudinal surveys. *The British Journal of General Practice*, 52(484), 912-916.
- Renn, O. (2004). Perception of risks. *Toxicology Letters* 149, 405–413.
- Rodgers, S., & Thorson, E. (2003). A socialization perspective on male and female reporting. *Journal of Communication*, 53(4), 658-675.
- Rogers Publishing. (2009). Chatelaine Media Kit. Retrieved May 10, 2009, from www.rogerspublishing.ca/portfolio/consumer/chatelaine_eng/
- Sandman, P. M. (2001). Explaining Environmental Risk: Dealing with the Public. Retrieved July 25, 2008, from <http://www.psandman.com/articles/explain3.htm>
- Sanmartin, C., Berthelot, J. M., Ng, E., Murphy, K., Blackwell, D. L., & Gentleman, J. F., et al. (2006). Comparing health and health care use in Canada and the United States. *Health Affairs (Project Hope)*, 25(4), 1133-1142.
- SAS/STAT. Version 9.1. SAS Institute Inc., Cary, NC, USA.
- Schiffman M., Castle P. E., Jeronimo J., Rodriguez A. C., & Wacholder S. (2007). Human papillomavirus and cervical cancer. *The Lancet*, 370, 890–907.
- Schwitzer, G., Mudur, G., Henry, D., Wilson, A., Goozner, M., & Simbra, M., et al. (2005). What are the roles and responsibilities of the media in disseminating health information? *PLoS Medicine*, 2(7), e215.
- Schwartz, L. M., & Woloshin, S. (2002). News Media Coverage of Screening Mammography for Women in Their 40s and Tamoxifen for Primary Prevention of Breast Cancer. *JAMA*, 287(23), 3136-3142.
- Sirkin, R. M. (2006). *Statistics for the social sciences (3rd ed.)*. Thousand Oaks, CA: Sage Publications.
- Sjöberg, L. (2002). Factors in Risk Perception. *Risk Analysis*, 20(1), 1-12.
- Slomovitz, B. M., Sun, C. C., Frumovitz, M., Soliman, P. T., Schmeler, K. M., & Pearson, H. C., et al. (2006). Are women ready for the HPV vaccine? *Gynecologic Oncology*, 103(1), 151-154.
- Stanley, M. (2005). Immune responses to human papillomavirus. *Vaccine*, 24(S1), S16-S22.

State of the News Media 2007. Project for Excellence in Journalism. Retrieved July 25, 2008, from <http://www.journalism.org/>.

Tichnor, P. J., Donohue, G. A., & Olien, C. N. (1980). *Community Conflict and the Press*. Thousand Oaks, Calif: Sage.

Taylor, C. A., & Sorenson, S. B., (2002). The nature of newspaper coverage of homicide. *Injury Prevention, 8*, 121-127.

Telford, R., & Rogers, A. (2003) What influences elderly peoples' decisions about whether to accept the influenza vaccination? A qualitative study. *Health Education Research, 18*(6), 743-753.

Transcontinental Media. (2009). Canadian Living Media Kit. Retrieved May 10, 2009, from <http://www.transcontinentalmedia.com/page-1220017874329.do?lang=en>

Vetter K. M., & Geller S. E. (2007). Moving forward: Human papillomavirus vaccination and the prevention of cervical cancer. *Journal of Women's Health, 16*, 1258-68.

Viswanath, K. (2006). Public communications and its role in reducing and eliminating health disparities. In G. E. Thomson, F. Mitchell, & M. B. Williams (Eds.), *Examining the Health Disparities Research Plan of the National Institutes of Health: Unfinished Business* (pp. 215–253). Washington, DC: Institute of Medicine.

Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior, 27*(5), 591-615.

Witte, K., Meyer, G., & Martell, D. (2001). *Effective health risk messages: A step-by-step guide*. California: Sage Publications, Inc.

Words Count. (2007). SMOG Calculator. Retrieved July 25, 2008, from <http://www.wordscount.info/hw/smog.jsp>

World Health Organization. (2008). *Initiative for vaccine research*. Retrieved July 07, 2008, from http://www.who.int/vaccine_research/diseases/viral_cancers/en/index3.html

Wynia, M. K. (2006). Risk and trust in public health: A cautionary tale. *The American Journal of Bioethics, 6*(2), 3-6.

Wynia, M. K. (2007). Public health, public trust and lobbying. *The American Journal of Bioethics, 7*(6), 4-7.

Zimet, G. D., Mays, R. M., & Fortenberry, J. D. (2000). Vaccines against sexually transmitted infections: Promise and problems of the magic bullets for prevention and control. *Sexually Transmitted Diseases, 27*(1), 49-52.

Zimet, G. D., Shew, M. L., & Kahn, J. A. (2008). Appropriate use of cervical cancer vaccine. *Annual Review of Medicine*, 59, 223-36.

Zimmerman, R. K. (2006). Ethical Analysis of HPV vaccine policy options. *Vaccine*, 24, 4812-4820.