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EXAMINING THE ROLE OF MEDIA COVERAGE AND TRUST IN PUBLIC HEALTH AGENCIES IN H1N1 INFLUENZA PREVENTION

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Abstract

Using data from a national probability sample of 518 American adults, this study investigates if media coverage of H1N1 influenza, sociodemographic characteristics, health status and certain psychological variables predict compliance with behavioral recommendations from the U.S. Centers for Disease Control and Prevention (CDC) to prevent the H1N1 flu. Individuals were surveyed in October and November, 2009, about their intention to be vaccinated against H1N1 influenza and their adoption of other preventive behaviors recommended by the CDC. Logistic regression and multiple regression analyses were used to assess if vaccination intention and behavioral adoption were associated with exposure to media coverage of H1N1 influenza and other predictors of preventive behaviors identified in previous research. Statistical analyses showed that different variables were associated with different preventive behaviors.

Exposure to media coverage predicted the adoption of everyday precautions (washing hands more frequently and avoiding close contact with people showing flu-like symptoms) and with discussing one's H1N1-related concerns with a doctor. Intention of receiving the newly-developed H1N1 vaccine was not predicted by media exposure but by confidence in the CDC's ability to manage the pandemic. Associations were also found between certain sociodemographic variables and the adoption of various preventive behaviors.

Findings from this study suggest that exposure to media coverage of public health emergencies may enhance adherence to simple precautions recommended by health agencies, whereas confidence in health authorities may be necessary to motivate compliance with a more effortful or somewhat controversial recommendation, such as receiving a newly-developed flu vaccine.

Keywords: H1N1, influenza, preventive behavior, vaccination, media, trust, public health agencies, public health emergencies.

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Introduction

The global outbreaks of H1N1 influenza in 2009 exemplified several trends in the spread and control of emerging infectious diseases (EIDs) in the 21st century. Technological and societal changes allowed both the H1N1 flu and information about this flu to spread swiftly. Individuals were able to follow this disease's rapid development into a pandemic through round-the-clock media coverage. This paper investigates whether or not media coverage of the H1N1 flu played a role in managing the spread of H1N1 influenza in the United States. More specifically, survey data were collected and analyzed to determine if American adults' adherence to behavioral advice from the Centers for Disease Control and Prevention (CDC) during the H1N1 flu pandemic was influenced by their exposure to media coverage of this novel flu over and above key sociodemographic variables previously found to predict preventive behaviors.

Public health practitioners and researchers are paying increased attention to the potential role that the mass media could play in facilitating public understanding of EIDs and in motivating public compliance with precautionary measures recommended by public health agencies. As a consequence, the World Health Organization (WHO) and other leading health agencies have issued guidelines in recent years to help health officials work effectively with the media during public health emergencies (1,2). Researchers have also started devoting attention to the different approaches taken by public health officials and journalists in communicating the same public health emergency to the public (3,4) and the conventions employed by news organizations in covering EIDs (5,6).

However, there has been little effort to systematically examine the consequences of media coverage of EID outbreaks. Based on anecdotal evidence, some scholars have suggested that media coverage of public health emergencies tends to be detrimental to the goal of disease control because journalists have their own conventions for repackaging and reporting information from health experts, such as focusing on a single extreme case or on the number of fatalities. Consequently, media coverage of an EID may influence public perceptions

and behaviors in ways unintended by public health officials (6,7). Nevertheless, public health agencies seem optimistic that appropriate strategies and guidelines can be developed to guide productive collaboration between health officials and news organizations during a health emergency. In order to empirically investigate the role of the news media during a public health emergency, this paper uses the H1N1 flu pandemic as a case study and seeks to determine whether exposure to H1N1-related media reports is associated with adherence to behavioral recommendations from public health authorities.

As the public health agency overseeing the national response to the H1N1 flu outbreaks in the United States, The Centers for Disease Control and Prevention (CDC) recommended a number of preventive behaviors to the general public at the start of the 2009-2010 flu season to reduce individuals' chances of becoming infected with H1N1 influenza. Besides practicing everyday precautions, including washing one's hands with soap or using hand sanitizer more frequently and avoiding close contact with people showing flu-like symptoms, the CDC also encouraged individuals to talk to their doctor if they had any H1N1-related concerns (8). Furthermore, members of the public were asked to be vaccinated against H1N1 – a process that began in October 2009 when the vaccine became available.

Compared to the other H1N1 prevention measures recommended by the CDC, H1N1 influenza vaccination was probably the most controversial due to concerns over the safety of the relatively new and untested H1N1 flu shot as well as problems associated with delayed and unequal vaccine distribution (9-12). It is therefore of interest to investigate if the pattern of association between exposure to media reports about the pandemic flu and the intention to receive the newly-developed H1N1 vaccine differs from the pattern of association between media exposure and the adoption of more traditional preventive measures, such as more frequent hand-washing and avoiding close contact with sick individuals.

The influence of the media is typically implied rather than explicitly stated in existing models of health behavior change. For example, the Health Belief Model (13,14), one of the most widely utilized behavior change theories, hypothesizes that the likelihood of adopting a preventive health behavior is

enhanced to the extent that an individual perceives that the condition – here contracting the H1N1 flu – is serious (perceived severity), feels himself or herself to be at risk (perceived susceptibility), believes that the prevention behavior being recommended is effective and beneficial (perceived benefits), that the physical and psychological costs of the advised behavior are reasonable (perceived barriers), and that he or she is capable of overcoming obstacles and performing this preventive behavior (self-efficacy). The model further states that the probability of an individual adopting a new behavior is enhanced by the presence of cues to action.

Traditionally, cues to action are operationalized in public health research as advice or reminders from a health care provider to a patient (15,16). However, cues to action can also be mass mediated. In fact, it is plausible to expect the contemporary mass media to be a primary provider of cues to action to the general public during a public health emergency, given the media's ability for almost instant and population-wide dissemination of information. Thus far, however, there is little empirical research on the potential impact of media cues during a public health crisis, a gap that this paper seeks to address.

In addition to the psychological predictors identified by the Health Belief Model, there is also evidence that an individual's current health condition and sociodemographic characteristics – including age, gender, income, race and education level – may also influence compliance with preventive behaviors recommended by health officials (17,18). Furthermore, studies conducted during recent EID outbreaks have demonstrated that trust in public health agencies tend to affect adherence to official advice (19,20). Whether these psychological, sociodemographic and physiological variables known to have influenced the adoption of preventive behaviors in previous epidemics also predict adherence to behavioral recommendations aimed at preventing the H1N1 flu is examined in the present study. Finally, given the diverse nature of the H1N1-preventive behaviors recommended by the CDC – ranging from everyday precautions to talking with a doctor about H1N1-related concerns to receiving the somewhat controversial H1N1 flu shot – it is of particular interest to investigate if different variables are predictive of different preventive behaviors.

Methods

Data were analyzed from the Annenberg National Health Communication Survey (ANHCS), an ongoing cross-sectional survey of a national probability sample of US adults aged 18 years or older. Since April 2005, between 250 and 300 individuals recruited through list-assisted random-digit dialing have responded to ANHCS each month. In the core section of ANHCS, respondents are asked about their sociodemographic attributes and their health status, including whether they have suffered from diabetes, HIV/AIDS, heart disease, stroke, cancer, kidney disease and lung or breathing problems. These health conditions have been identified by the CDC as risk factors for severe complications from H1N1 influenza.

In October and November, 2009, items were added to assess the respondents' perceived susceptibility to and perceived severity of H1N1 influenza, their beliefs about the benefits and costs of vaccination in general, their confidence in the CDC's ability to effectively respond to the H1N1 flu and their exposure to news media coverage of H1N1 influenza. Respondents were also asked if they had washed their hands with soap or used hand sanitizer more frequently, avoided close contact with sick individuals, or talked to a doctor about their H1N1-related concerns in response to the influenza pandemic.

Furthermore, respondents were asked to indicate on a 10-point scale how likely they were to get a free H1N1 shot when it became available. Finally, respondents were asked if they were currently pregnant because pregnancy constituted a known risk factor for H1N1-influenza complications. Multiple regression analyses were used to identify variables associated with respondents' intention of getting the H1N1 vaccine, and logistic regression analyses were used to identify predictors of the other preventive behaviors. All analyses were performed with SPSS software, version 18 (SPSS Inc., Chicago, Illinois).

Results

A total of 626 respondents were surveyed in October and November of 2009. At that time, only 16 (2.6%)

had been vaccinated against H1N1 influenza. These individuals were removed from the sample in subsequent statistical analyses because vaccine shortages and unequal vaccine distribution across geographic locations during the study period caused problems for meaningful interpretation of their results. When screening for missing values, the question with the largest number of missing values pertained to respondents' confidence level in the CDC's ability to deal with H1N1 influenza. Thirty-nine respondents (6.2%) selected the "Don't Know" option for this question, and they were removed from subsequent analyses after logistic regression results indicated that they did not differ in sociodemographic attributes or underlying health conditions from those who reported their confidence level. Respondents with missing values on any of the other variables of interest were also eliminated from subsequent

analyses, resulting in a final sample size of 518 adults over the age of 18 years.

After applying sample weights to account for known deviations due to non-coverage and non-response error and to make the sample demographically similar to the US adult population based on census data (21), logistic regression analyses were computed to identify variables associated with the adoption of H1N1-preventive behaviors, and multiple regression analysis was used to identify predictors of intention to receive the H1N1 flu shot. All independent variables were entered into each logistic regression model simultaneously, and an odds ratio (OR) was calculated for each independent variable. Results from the regression analyses are presented in table 1.

Table 1. Logistic regression and multiple regression results (n = 518)

	More Frequent Hand-washing, OR (95% CI)	Avoid Close Contact With Sick People, OR (95% CI)	Discussing H1N1 Concerns With a Doctor, OR (95% CI)	Intention to Get H1N1 Flu Vaccination, b
Male	0.65 (0.39, 1.08)	1.03 (0.70, 1.52)	1.30 (0.85, 1.99)	-0.03
Black	1.80 (0.68, 4.76)	2.46* (1.14, 5.29)	1.79 (0.85, 3.77)	-0.99*
Latino	4.84* (1.49, 15.69)	3.32** (1.58, 6.98)	1.88 (0.98, 3.62)	0.50
2+ races	0.51 (0.19, 1.38)	0.58 (0.24, 1.43)	2.88* (1.09, 7.61)	0.38
Other race	4.57 (0.37, 56.46)	0.61 (0.15, 2.41)	0.57 (0.09, 3.46)	-0.02
Age	1.01 (0.99, 1.03)	1.01 (0.99, 1.02)	1.01 (1.00, 1.03)	-0.02*
Income	1.00 (0.98, 1.01)	1.00 (0.99, 1.01)	0.98** (0.97, 0.99)	-0.01
High School Graduate	0.67 (0.31, 1.48)	0.57 (0.30, 1.07)	1.93 (0.96, 3.90)	-0.54
Some College or More	1.14 (0.64, 2.04)	1.40 (0.90, 2.17)	1.24 (0.76, 2.03)	-0.71*
Risk Factors	0.92 (0.48, 1.73)	0.97 (0.61, 1.55)	1.96* (1.20, 3.20)	0.37
Perceived Susceptibility	1.07 (0.94, 1.22)	1.13* (1.03, 1.25)	1.05 (0.95, 1.17)	0.31***
Perceived Severity	1.11 (0.96, 1.29)	1.19** (1.07, 1.33)	1.02 (0.92, 1.13)	0.32***
Perceived Benefits of Vaccination	—	—	—	0.50***
Perceived Barriers to Vaccination	—	—	—	-0.59***
Confidence in CDC	1.26 (0.90, 1.78)	0.92 (0.71, 1.20)	0.75* (0.57, 0.99)	0.82***
Exposure to Media Coverage of H1N1	1.48*** (1.23, 1.78)	1.25* (1.01, 1.46)	1.46*** (1.21, 1.76)	-0.06

Note. OR = odds ratio; CI = confidence interval; b = unstandardized regression parameter estimates.

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Compared to Whites, Latinos were found to be almost five times more likely to adhere to the official advice of more frequent hand-washing with soap or hand sanitizer, controlling for the other variables (OR = 4.84; 95% CI = 1.49, 15.69). The only other independent predictor of more frequent hand-washing was exposure to media coverage of H1N1 influenza (OR = 1.48; 95% CI = 1.23, 1.78).

Compared to Whites, both Latinos (OR = 3.32; 95% CI = 1.58, 6.98) and African-Americans (OR = 2.46; 95% CI = 1.14, 5.29) were more likely to take steps to avoid being near someone with flu-like symptoms. Other factors associated with this avoidance behavior included perceived susceptibility to H1N1 influenza (OR = 1.13; 95% CI = 1.03, 1.25), perceived severity of the disease (OR = 1.19; 95% CI = 1.07, 1.33), and exposure to H1N1-related media coverage (OR = 1.25; 95% CI = 1.01, 1.46).

Twenty-three individuals in the sample reported being simultaneously of two or more races, and they were found to have greater odds of discussing H1N1-related concerns with a doctor compared to Whites (OR = 2.88; 95% CI = 1.09, 7.61). Having a lower income per household member was associated with higher chances of discussing H1N1-related concerns with a physician (2% decrease for each additional \$1,000 in annual income, 95% CI = 0.97, 0.99), so was having one or more underlying health conditions that increased one's risk for H1N1-flu complications (OR = 1.96; 95% CI = 1.20, 3.20). Furthermore, an individual's level of exposure to media coverage of H1N1 influenza was found to be positively associated with having H1N1-related conversations with a doctor (OR = 1.46; 95% CI = 1.21, 1.76), whereas one's level of confidence in the CDC's ability to effectively respond to the disease were found to be negatively related to physician conversations (OR = 0.75; 95% CI = 0.57, 0.99).

Being African-American was negatively associated with the intention of receiving H1N1 influenza vaccination ($b = -0.99$, $p = 0.05$), as was age ($b = -0.02$, $p = 0.05$). Compared to those without a high school diploma, individuals with at least some college education on average had a lower intention of getting the H1N1 flu shot ($b = -0.71$, $p = 0.05$). Feeling susceptible to H1N1 influenza ($b = 0.31$, $p = 0.001$), perceiving H1N1 influenza to be severe ($b = 0.32$, $p = 0.001$), perceiving vaccination in general to

be beneficial ($b = 0.50$, $p = 0.001$), associating lower psychological and physical costs with vaccination in general ($b = -0.59$, $p = 0.001$), and having more confidence in the CDC's ability to manage the H1N1 flu ($b = 0.82$, $p = 0.001$) were all positively related to vaccination intention.

Discussion

Statistical analyses demonstrated that different sets of variables were associated with the adoption of various preventive behaviors and vaccination intention during the 2009 H1N1 influenza pandemic. Cues to action in the form of exposure to media coverage of H1N1 influenza was found to play a pivotal role in motivating U.S. adults to wash their hands more frequently with soap or hand sanitizer, to avoid being near individuals showing flu-like symptoms, and to discuss their concerns regarding H1N1 influenza with a doctor. These findings challenge some scholars' contention that the mass media tend to play a counterproductive role during a public health emergency by constantly emphasizing extreme cases over the average and opinions over data (6). Given new and traditional media's role as an important source of information and social influence in today's society, more empirical effort is needed to identify the factors leading to constructive media effects during a pandemic or other public health emergency. Once identified, these factors can then be incorporated into public health agencies' guidelines on working effectively with the media during an emergency.

In line with previous research (17,18), individuals' compliance with behavioral advice from the CDC also depends upon a number of sociodemographic variables, such as age, race, education and income. However, the present study demonstrates that the influence of these sociodemographic variables is by no means constant and can vary across preventive behaviors. For instance, compared to Whites, Latinos and African-Americans in our sample were more likely to avoid close contact with someone showing flu-like symptoms in response to H1N1 influenza. This discrepancy might be due, in part, to the disparities in health insurance coverage among ethnic groups. Data indicated that in 2008, 31% of the Latino population

and 19% of the African-American population did not have health insurance, whereas only 11% of the White population was uninsured (22). Consequently, Hispanics and African-Americans might be more motivated to avoid getting H1N1 influenza because they could not afford the costs associated with treating the disease and its complications.

Compared to Whites, Latinos also reported washing their hands with soap or hand sanitizer more frequently. Given that H1N1 influenza is believed to have originated in Mexico and caused substantial socioeconomic disruptions in that country, it was not unexpected that Latino residents in the U.S. would be more sensitized to the disease. Factors such as more frequent travel to Mexico or communication with family or friends affected by the outbreaks in Mexico might have provided additional incentives for the Latinos in our sample to adopt simple precautionary measures, such as hand-washing and avoiding sick individuals.

Interestingly, the likelihood of having a H1N1-related discussion with a doctor decreased with income. This finding appears to contradict previous research showing that individuals with higher social economic status (SES), measured in terms of income and education, are more likely to adopt preventive health behaviors (17). However, it is plausible that individuals with higher SES have more and better resources to help them make sense of the evolving information on H1N1 influenza and therefore have a lower need to seek clarification or reassurance from a doctor. Moreover, research has demonstrated that individuals with higher incomes or education are more likely to search for health information online (23), and therefore they may not need to turn to their own doctor when they have questions or want additional health information. In other words, the negative relation between income and talking to a doctor about H1N1-related concerns cannot simply be interpreted as noncompliance with official recommendations. Rather, it needs to be understood within the context that higher SES is typically associated with greater resources and capabilities in information-seeking and information-processing.

Another variable associated with individuals' likelihood of talking to a doctor about their H1N1-related concerns is confidence in the CDC's ability to deal with the pandemic flu. It is plausible that those

with more confidence in the CDC are less doubtful of the information the agency provides to the public and, consequently, they feel a lower need to seek information from alternative sources like a physician. This suggests that building public confidence in health agencies may provide a buffering mechanism to prevent doctors from being overwhelmed with inquiries from concerned individuals during a pandemic.

Regarding the intention to receive the H1N1 vaccine, younger individuals in our sample reported a greater intent to be vaccinated. This suggests that the CDC's message about younger people being at elevated risk for the pandemic flu was getting through to the public. Furthermore, respondents without a high school diploma were more likely than those with at least some college education to intend to be vaccinated. This is in line with previous research findings on the positive association between one's education level and one's level of concern about medical contraindications resulting from vaccination (24).

Compared to Whites, African-Americans in our sample expressed less intention to be vaccinated against H1N1 influenza, and this held true even when the influence of an individual's susceptibility and severity beliefs and their perceptions of the costs and benefits of vaccination in general was statistically accounted for. This is consistent with past research showing that African-Americans tend to hold more negative beliefs and more resistant attitudes toward seasonal influenza vaccination compared to other races (25). Clearly, health agencies need to continue to look into the underlying causes behind African-Americans' hesitation or unwillingness to be vaccinated against influenza in order to develop targeted messages to encourage vaccination within this community.

Psychological factors identified by the Health Belief Model, including an individual's perceived susceptibility to the H1N1 flu, their perceived severity of the disease as well as their beliefs about the costs and benefits of vaccination in general, all influenced their intention to receive the H1N1 flu shot in the direction predicted by the model. In other words, intent to be vaccinated was positively related to believing that H1N1 influenza was severe, feeling personally susceptible and associating vaccination

with a relatively high level of benefits and a low level of costs. These findings suggest that public health agencies may do well to rely on validated theoretical frameworks of behavioral change, such as the Health Belief Model, to develop future risk communication strategies.

Another psychological variable, confidence in the CDC's ability to effectively respond to the pandemic flu, also affected individuals' intention to receive the H1N1 flu shot. However, confidence in the CDC did not appear to enhance adherence to everyday precautions, such as more frequent hand-washing or avoiding sick individuals. This suggests that confidence in health agencies may be most crucial when it comes to compliance with a more effortful, relatively new or controversial recommendation, such as receiving the newly-developed H1N1 shot. In light of the constant emergence of new diseases and new treatments, public health agencies must give priority to building and maintaining public confidence.

The present study was limited by the fact that self-efficacy associated with practicing various H1N1-preventive behaviors was not measured directly and therefore could not be entered into the analyses. One could argue, however, that self-efficacy or feeling that one is capable of performing a specific behavior is not a major factor with respect to everyday precautions such as washing one's hands more frequently or trying to avoid close contact with sick individuals, and therefore this psychological factor might not have a strong influence over the adoption of these everyday behaviors. Whether self-efficacy prevents individuals from discussing their concerns about a newly emerging disease with a doctor remains to be addressed by future studies.

Another limitation of this study was that it assessed factors associated with the intention to be vaccinated against H1N1 influenza rather than the actual behavior of having received the vaccine. While behavioral intent is commonly used as a proxy for the actual behavior of interest, it is a less than perfect measure. However, given Americans' limited access to the H1N1 flu vaccine in October and November of 2009, behavior intent was the only option available. The self-reported nature of the data might also lead to problems associated with individuals' tendency to over-report their adoption of preventive behaviors. While future efforts should be made to verify the

actual behaviors of survey respondents, self-reported data remain the only way for assessing individuals' health beliefs, confidence in health agencies, and other psychological variables known to influence health behaviors. In addition, the cross-sectional nature of the data did not allow causal inferences to be made. Finally, it should be noted that we surveyed a random sample of adults living in the United States, and further research is needed to determine the extent to which our findings on media exposure and trust in public health agencies are generalizable to other parts of the world.

Despite these limitations, the present study has illustrated that a complex pattern of association exists between adherence to official recommendations and a range of predictors during an EID outbreak. Our findings suggest that the nature of an emerging disease, the way it is communicated to the public by the mass media, the nature of the preventive behavior recommended by a public health agency, and the public's level of confidence in that agency are all likely to influence compliance with the recommended behavior. In line with previous research, sociodemographic attributes may also affect compliance, but different sociodemographic variables are likely to be associated with different preventive behaviors.

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