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Social Media and Participatory Risk Communication during the H1N1 Flu Epidemic: A Comparative Study of the United States and China

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Abstract: Despite the wide applaud about social media's capacity to allow public participation in content creation and circulation, they do not automatically ensure open and transparent communication because of institutional and cultural constraints. Our study of the use of social media during the H1N1 flu epidemic in the U.S. and China demonstrates that governmental apparatuses may use social media tools for one-way dissemination of risk decisions and policies or limited two-way risk communication. In contrast, the general public may circumvent the institutional control of risk information through extra-institutional participatory risk communication to find out truths about the emerging risks. [China Media Research. 2010; 6(4): 80-91]

Keywords: risk communication, participation, social media, H1N1 flu, extra-institutional

At its beginning stage, the H1N1 flu pandemic caused tremendous fear all over the world both because of its incalculability and the potential paralyzing economic losses it might cause. With the development and production of vaccines, our fear of H1N1 flu has been greatly alleviated. However, the possible mutation of avian flu viruses still looms near. With avian flu posing a constant pandemic threat capable of breaking out in any part of the world, the study of risk communication practices in both Western and non-Western cultures becomes a necessity for us to collaborate with other cultures in global epidemics.

Earlier risk communication studies highlight the need to move from linear one-way risk communication to participatory risk communication. Social media tools help to break down the linear one-way risk communication and make it multichannel and thus more participatory. However, the patterns of social media use can be drastically different across cultures. This comparative study of risk communication practices in the United States and China demonstrates that medical institutions in the U.S. utilized social media tools to communicate about the risks on a real-time basis. In comparison, the official health apparatuses in China made little use of social media even though the public resorted to all kinds of social media to obtain risk information. As a comparative research on risk communication via social media, our study not only helps to understand the creation and exchange of user-generated knowledge but also evaluates its impact on risk communication. It also pinpoints gaps and problems in existing risk communication theories as well as possible ways to expand such theories to better address new issues and novel situations.

This article starts with a review of risk communication theories and calls attention to the little-explored larger issues of cultural differences, national

interests, and media structures in various cultural contexts. What follows is an analysis of the different ways governmental institutions, commercial Internet portals, and communities employed social media to communicate risks about the H1N1 flu at the early stage of the epidemic. We discuss different approaches to using social media for participatory risk communication and their implications for those interested in promoting open two-way communication during health risks.

Risk communication and social media

Risk Communication and alternative media

Grabill and Simmons (1998) called the predominant linear risk communication models "the technocratic approach," which views risk communication as a one-way, linear process with scientists and experts functioning as knowledge producers offering risk analyses and the public as consumers of such knowledge. They consider the technocratic approach inadequate because it ignores power relations, audience participation, and democratic decision making. Leiss and Powell (2004) blamed the marked differences between the "the scientific and statistical language of experts vs. the intuitively grounded language of the public" as the cause of poor risk communication results. To achieve effective risk communication practices, we have to "break down the barrier between the two languages [of experts and layman]" to "facilitate the productive exchanges between the two spheres" (p. 29).

One problem with existing risk communication theories is their focus on North America as the unit of analysis. They fail to address issues posed by cultural, political, and infrastructural differences between North America and other countries with vastly different political and communication structures as well as challenges to traditional risk communication practices

posed by new media such as the Internet and newly emerging social media. For instance, in China, the Central Propaganda Department constantly exerts media surveillance on both print and online electric media to filter out “unhealthy” content. The state apparatuses come up with new means of e-surveillance, i.e., IP-blocking and content-filtering system, to transform the Internet into another tool for the existing exclusionary discourse practices and to control the flow of information to its citizens. Co-opted by the Chinese government, international Internet service providers such as Yahoo developed and employed effective self-censoring technologies to conform to the existing e-surveillance practices so that they could obtain sizable market shares in the rapidly expanding Chinese market. Technology-savvy Internet users managed to circumvent the official censorship by turning to various technologies to seek entry to banned sites and to publish in alternative media.

As “the low-status, ‘trickle-down media’” and “the bottom feeders in the data ocean” (Rushkoff, 1996, p. 179), alternative media produce counter-hegemony messages to “disrupt the silence and to provide the truth” (Downing, 2001, p. 15-16). Ding (2009) explored the use of alternative media such as independent websites, word of mouth, and text messaging in risk communication practices about SARS. She traced transnational, extra-institutional risk communication efforts made by whistleblowers, which helped to force China to offer transparent and honest daily updates about its SARS cases. Building on Ding’s study, this project examines the impacts of cultural and political contexts, communicative practices, and media structures on the way risk communication operated in both the U.S. and China. We focus on the use of social media and suggest possible ways to build a theory to study global risk communication practices.

Tactics and Strategies

De Certeau (1984) introduced the two concepts of tactics and strategies to describe institutional and extra-institutional intervention and action. Tactic is “a calculated action” taken by the powerless who have no space in the power apparatuses and thus no “spatial or institutional localization” (de Certeau, 1984). As “an art of the weak,” a tactic depends on “a clever utilization of time” (xix) and always watches for “the precise instant of an intervention [which can be] transform[ed] into a favorable situation” (p. 39). It “vigilantly make[s] use of the cracks that particular conjunctions open in the surveillance of” the dominant power (p. 37). Strategies, in contrast, are “systems and totalizing discourses” (p. 36) created by an institution with a “place of its own power and will” (p. 38). Strategies are used to influence, guide, or manipulate human society. For instance, in the media contestation in China during the SARS outbreak,

the state apparatuses maintained strategic control of both traditional mass media and the Internet through constant policing. To circumvent the state surveillance, the public resorted to the tactical use of alternative media to distribute and receive unauthorized risk messages and dissenting political views (Ding, 2009). These two concepts are particularly useful and pertinent in this study, as we will examine both top-down and bottom-up use of social media in risk communication processes.

Communication Technologies and Social Media

Several theorists emphasized the political and cultural impacts of mobile communication as a means of supporting insurgent politics (see Castells, Fernandez-Ardevol, Qiu, and Sey, 2007; Rheingold, 2002). Whereas Castells et al (2007) stressed its capacity to enable the spread of “rumors, inaccurate information [...] and truth” through interpersonal networks (p. 209-212), Rheingold (2002) described how it helped people “gain new forms of social power and new ways to organize their interactions and exchanges just in time and just in place” in the People Power II smart mobs in Manila (p. xii). With the rise of social media such as blogs, Facebook, Twitter, Flickr, and Youtube, users become constantly connected and interacting with one another. They share ideas, files, and risk messages on a real-time basis, which enables them to evade institutional control of information.

Kaplan and Haelein (2010) defined social media as “a group of Internet-based applications” with two features: first, they build on “the ideological and technological foundations of Web 2.0,” which allows the continuous modification of content and applications “by all users in a participatory and collaborative fashion” (p. 61). Second, social media “allow the creation and exchange of user-generated content,” which results in enhanced interactivity and the democratization of information (p. 61). Topper (2009) listed various types of social media, i.e., blogs, microblogs provided by Twitter, Real simple syndication (RSS), wikis, Internet forums or online message board for non-synchronous discussion group, chat rooms for synchronous discussions, Listservs, SMS or text messages, social bookmarking, podcast, video sharing tools such as Youtube, and social networking tools such as MySpace, Facebook, and LinkedIn. Social media have been widely discussed in areas such as public relations, corporate communication, and marketing (see Brown, 2008; Topper, 2009; Mangold & Faulds, 2009). However, only a small number of studies have been done to examine the role social media play in professional communication and health communication. Potts (2009) investigated how participants communicated about the disaster of the 2005 London bombing through the use of Flickr, the photo-sharing social media. Ding (2009) explored the use of

text messages and Internet forums for bottom-up participatory risk communication in the global epidemics of SARS.

Research design and data collection

This is a multi-dimensional, cross-cultural comparative study about risk communication via social media. The study compares the different functions of social media in risk communication during the outbreak of H1N1 flu at national, institutional, and extra-institutional levels in both the U.S. and China from April to October 2009. The first part of the study compares the ways leading health authorities in both the U.S. and China employed social media in their official risk communication processes. We select from both countries the principal agencies for protecting the health and providing essential human services, namely, the U.S. Department of Health and Human Services

(DHHS) and Ministry of Health of the People’s Republic of China (MOH) as well as the Centers for Disease Control and Prevention (CDC) in both countries, which are the agencies directly responsible for health risks like H1N1 flu. (see table 1). We limit this part of the study to two months from late April to June 11, which spanned from the beginning of the epidemic to the date when the WHO finally announced that the H1N1 flu had become a pandemic. The second part examines the use of social media by Chinese netizens via commercial web portals for breaking through the restricted official risk communication process in China from late April to October. The third part moves on to analyze the official and unofficial risk communication efforts surrounding a local outbreak among Beihang University (Beijing University of Aeronautics and Astronautics) freshmen undergoing military training in October.

U.S.	China
DHHS: Flu. Gov http://www.flu.gov/	MOH: H1N1 Flu http://www.moh.gov.cn/publicfiles/business/htmlfiles/H1N1/index.htm
CDC 2009 H1N1 Flu http://www.cdc.gov/h1n1flu/	CDC H1N1 Flu http://www.chinacdc.cn/n272442/n272530/n273736/n273781/n4624704/index.html

Table 1. Health authorities from the U.S. and China and their H1N1 websites.

After we identified different social media applications from the above websites and collect texts from each social media application, we examined the ways their social media texts functioned to communicate the H1N1 risks, using both existing risk communication researches and the labels provided on the websites for coding purposes.

For the second part, we examined the social media texts published by both medical experts and the general public in sina.com, the most famous Chinese commercial website with the largest registered user group. We collected texts from Sina blog, the most used social media application, and employed both open coding and axial coding to categorize the risk messages. We paid particular attention to political sensitive words to see to what extent social media enabled the public to participate in risk communication processes. For the third part, we start with an overview of the official coverage of the Beihang outbreak in mainstream newspapers before moving on to the contesting social media discourses published by students directly affected by the local outbreak. We analyze the ways students employed different social media to reveal inside views about the Beihang event and the responses from the general public, the mainstream journalism and the officials.

Results and findings

Our research findings are comprised of three parts according to the research design: First, we show the types, frequencies and functions of various social media used by American health authorities to communicate about H1N1 flu risks. Second, we examine the Chinese health authorities’ limited use of social media in official risk communication processes and the use of blogs to invite user participation by the Chinese commercial web portal sina.com. Third, we investigate the official news reports and unofficial contesting discourses generated by social media around a local H1N1 flu outbreak among Beihang University freshmen in Beijing.

Social Media Use in the U.S. Official Risk Communication

WHO’s first news report on the H1N1 flu titled “Influenza-like illness in the United States and Mexico” appeared on its website on April 24, 2009. In response to the outbreak, on April 26, 2009, the Secretary of the DHHS declared it as a public health emergency. After near two months of updating and evaluating the level of the outbreak worldwide, on June 11, Dr. Margaret Chan, the director-general of the World Health Organization announced that H1N1 flu had become a pandemic. This near-two-month initial stage could be characterized as

the most important stage for risk communication with a high level of uncertainty for both the officials and the general public.

Since late April, instead of merely utilizing the traditional media as outlets for information, the U.S. CDC and DHHS had been working together to provide consumers and partners with social media tools that disseminated information about the ongoing H1N1 flu epidemic. These social media tools and sites disseminate personalized messages, enhance their outreach efforts, and build a communication infrastructure based on open information exchange (Social Media at CDC, 2009). For instance, the number of CDC's Twitter followers increased from 2,500 before the H1N1 flu outbreak to 370,000 in late June, 2009 (Currie, 2009, p. 10). This drastic increase in people who accessed CDC tweets regularly clearly suggests the potential of social media to reach a large population on a real-time basis during times of crisis.

CDC has created an individual webpage titled "social media campaign" on its website and has constantly utilized a variety of social media tools to communicate risk messages to the general public. DHHS' website, flu.gov fully cooperates with CDC to provide comprehensive government-wide information on H1N1 flu pandemic to the general public, health and emergency preparedness professionals, policy makers, government and business leaders, school systems, and local communities.

From April 24 to June 11, 2009, CDC used seven kinds of social media tools, i.e., buttons and badges, e-Cards, Flickr, Twitter, Facebook, YouTube, Widgets and Podcasts, while HHS just used Facebook, YouTube and Widgets. There were 285 pieces of information generated in total during the risk communication, and the formats of the information varied in different social media tools ranging from texts to image, video and audio files.

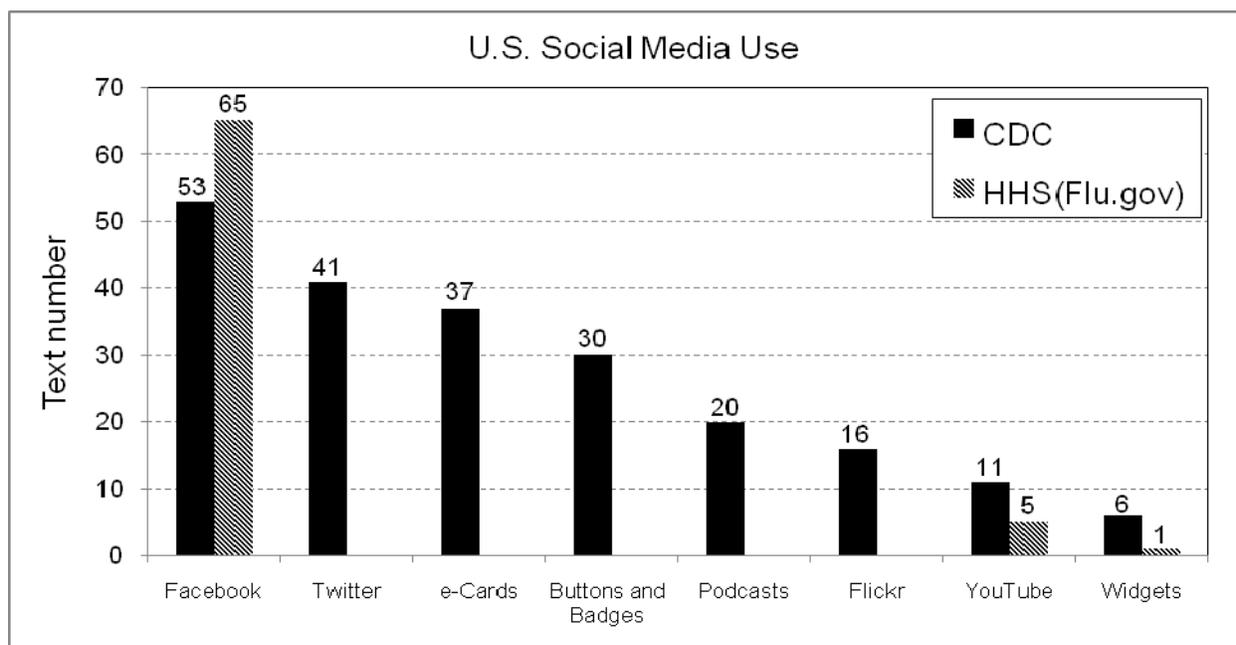


Figure 1. Social media use by the U.S. CDC and DHHS during the H1N1 flu epidemic.

Figure 1 shows that the most frequently used social media tool is Facebook with the highest numbers for both CDC and DHHS, which accounts for 41.4% of the total use of social media. The second frequently used one is Twitter (14.4%) and the least frequently used one is widgets (2.5%). Compared to the comprehensive use of social media tools by CDC, DHHS utilized much fewer types of social media. Although flu.gov employed Twitter and blogs for outreach purposes, the first tweet was on July 2 and the first blog post was on September 16, therefore those texts are excluded from this analysis due to the timeline. Because of the collaboration

between the two government agencies, many of the resources and materials have great overlaps. Also since social media is "rooted in conversations between anchors, people and peers" (Evans, 2008, p.33), much information has been shared across different social media applications. For example, the same video clip for H1N1 flu prevention could appear on Twitter, Facebook and YouTube on the same day.

Based on the analysis from Figure 1, among all the social media tools, Facebook and Twitter were the most frequently used ones for the risk communication. Therefore, texts from these two sites were collected for

further analysis. During the period from April 24 to June 11, 41 posts were published in CDC's Twitter page, 53 posts in CDC's Facebook page, and 69 posts in DHHS (flu.gov)'s Facebook page. All these posts were coded according to their contents and functions categorized on the CDC website in the risk communication process.

Generally, possible ways to manage people's risk perceptions and to engage people in making the best decisions are the two major concerns during risk communication process. We identified six distinctive categories of risk communication messages in the texts published in both CDC and DHHS websites, which include: 1) General information about H1N1 flu: knowledge of the risk provided by medical experts and public health officials. 2) H1N1 flu update: reports on the H1N1 flu activity in the U.S. (from CDC) and all

over the world (from WHO). 3) Prevention tips: educational information to help the general public to protect themselves from contracting the virus. 4) Policies and guidelines: policies and guidelines for health departments at national and state levels, health professionals, policy makers, government and business leaders, schools, and local communities to control the spread of H1N1 flu. 5) Official actions and efforts: official announcements from WHO, DHHS and CDC about the government actions, efforts and achievements during the anti-H1N1 flu campaigns. 6) Scientific research: reports on the scientific researches and findings of H1N1 flu virus and its transmission and impact, etc. The following figure shows the ratios of the different functional texts as employed by the three types of social media sites employed by the CDC and DHHS.

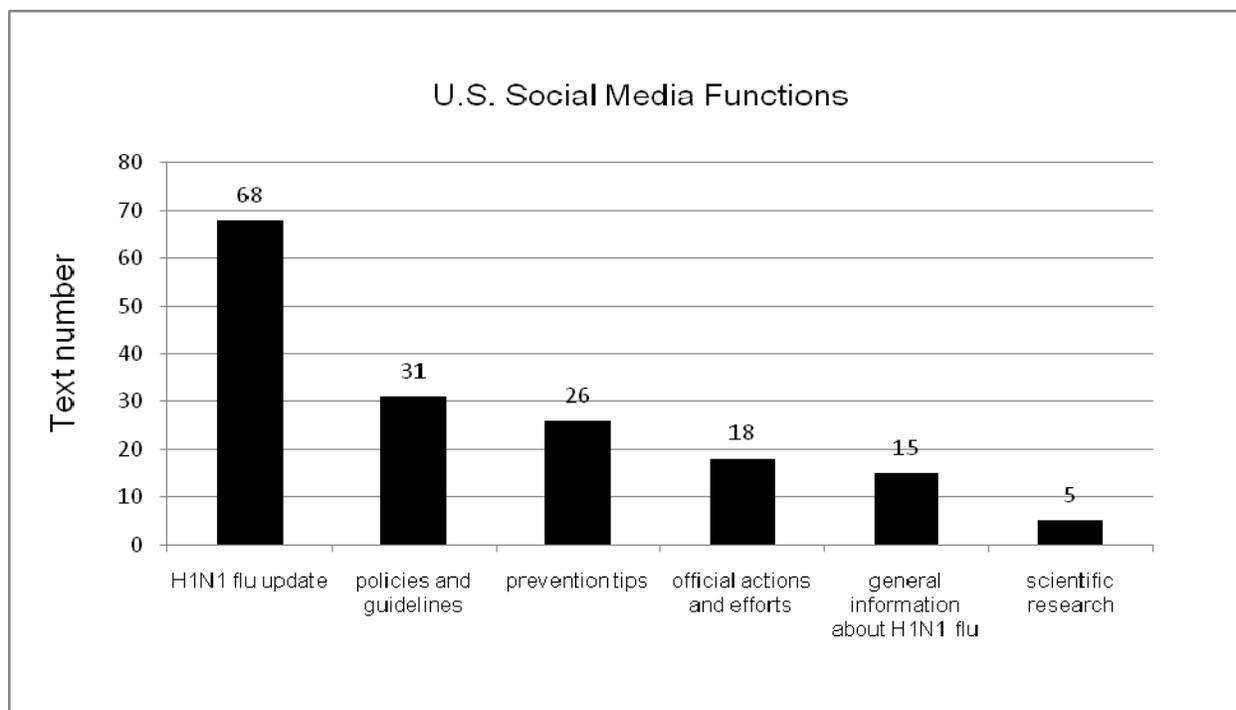


Figure 2. Social media functions used by the U.S. CDC and DHHS during the H1N1 flu epidemic.

As Figure 2 shows, 41.7% of the texts on the social media sites are about H1N1 flu update, 19.0% are about policies and guidelines, and 15.9% are about prevention tips. These top three categories reflect what Sandman (2006) described as the three "risk communication traditions": 1) helping people who are insufficiently concerned appreciate that a serious risk exists, 2) reassuring and calming people who are excessively concerned, and 3) working with people who are appropriately concerned to help them cope and function effectively (p. 257). The timeliness and open accessibility of the social media enable the real-time

dissemination of latest updates about risk situations. Moreover, official policies and guidelines on the social media sites may have greater reassuring effects because of the "vital role" social media could "play in winning trust" (Merrily, 2010).

Social Media Use in the Chinese Official and Unofficial Risk Communication

After the 2003 SARS crisis, Chinese government has made great progress in risk communication and was able to respond to the H1N1 flu outbreak more quickly and effectively. However, compared to transparent risk

communication practices in the U.S., Chinese government agencies still largely rely on the traditional media for information outlet. Therefore, risk communication in China is still restricted to a linear one-way process with highly controlled information exchange. During the H1N1 flu outbreak, Chinese CDC and MOH attempted to use social media tools such as leader's mailbox, discussion forum, online survey, and interview videos to facilitate their risk communication, which yielded very limited effects. While at the same time, the general public in China is able to break through this one-way risk communication through tactical use of social media applications, especially through blogs, discussion forums and social networking websites to exchange opinions and criticize government malpractices. For instance, leading commercial internet portals such as sina.com hosted specialized websites to disseminate risk messages about the flu and to aggregate blogs written by Chinese all over the world who wrote about their experiences of the flu epidemic. It also allowed readers to comment on blog posts and to interact with the bloggers.

On May 11, 2009, Xueyang Bao, an overseas Chinese student travelling from the U.S. to visit his relatives in Chengdu was diagnosed as the first confirmed H1N1 case in mainland China. On the same day, MOH held a press conference briefing the information about the first imported case and a national video conference releasing instructions to health departments at provincial and municipal levels. The Chinese CDC started its H1N1 flu webpage on April 24 and continuously provided updates with visual maps, clarification of the health risks, prevention tips, health guidelines, and official announcements until June 11. Although CDC's website incorporated social media for the public to post questions and have discussions, all the links were broken. On June 29, a special webpage devoted to the H1N1 flu outbreak appeared on the website of MOH; however, the website malfunctioned with a lot of broken links.

Whereas Chinese government agencies did not use online communication to its full potential and still largely relied on traditional print journalism, Chinese commercial web portals took up the tasks of risk communication to satisfy the need of the general public. As one of the largest commercial web portals in China, sina.com started the special website for H1N1 flu outbreak on April. 26. The information it provided was much more comprehensive than that on the government

websites. Besides official situation updates, the website provided the general public with a full range of information, discussions and opinions related to the risk perception and prevention tips from health experts and professionals. Since viewers of any article, image or post could leave comments, the general public could participate in the discussion and respond to other's comments as well.

As the blog service of sina.com, Sina blog ranks the second among all the blog servers in China according to China Internet Index System (CIIS). Sina's H1N1 flu webpage incorporated the content from Sina blog with an individual webpage called "Bloggers Witness". The first blog post appeared on April 28, right after a Chinese blogger living in Mexico posted an article called "Blogger in Mexico: Swine Flu Approaches My City". The blogger wrote about the real situation of the flu outbreak in Monterrey with pictures. Surprised by the soaring views of his post, he wrote, "the total number of views for my prior 98 articles does not even reach 8% of that for my two posts about the swine flu."

On May 11, the first diagnosed case of H1N1 flu in mainland China, Xueyang Bao wrote on his Sina blog to clarify his situation in order to combat the accusations and suspicions both on the Internet and in print journalism that he intentionally brought back the virus from the U.S. to China. In the blog post titled "Please Call Me Bao Xueyang" he explained all the details of his itinerary from the U.S to China, and claimed that he hadn't contracted the flu in the U.S. This single post attracted 96098 views. Also on the same day, a quarantined patient who took the same plane with Xueyang Bao first started to publish her quarantined diary on Sina blog, which attracted more than 80,000 views and thousands of replies and comments.

Until June 11, there were 148 blog posts about the daily experiences and witnesses of H1N1 flu by grassroots bloggers, which accounted for 58% of the total posts. And as a special feature of Sina blog, 67 celebrity blog posts from famous journalists, doctors, officials, and intellectuals were highlighted, which showed a range of comments and critiques related to the flu and the economic and political impacts of the flu. The director of Beijing CDC also published a blog on the work done at Beijing CDC, which attracted 48622 views and 407 comments. Finally, 40 blog posts were published about the prevention tips of H1N1 flu.

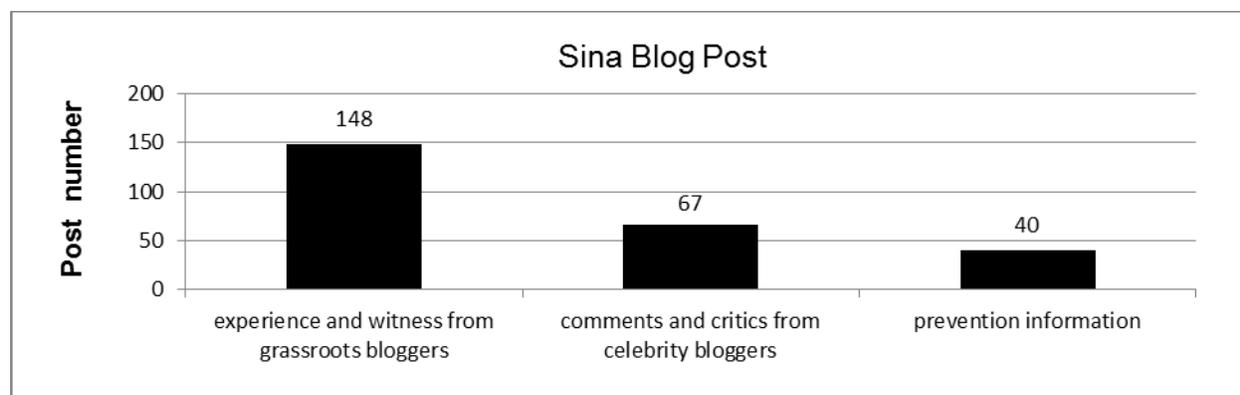


Figure 3. Use of Sina blogs during the H1N1 flu epidemic by the general public.

Compared to the U.S. use of social media, Chinese social media use was largely limited to fewer types and limited functions. While the U.S. government websites used seven types of social media, their content was dominated by the top-down official perspectives and didn't have much information originally generated by the public. In contrast, sina.com mainly relied on user blogs to aggregate information about personal experiences in the H1N1 flu epidemic and all the information on Sina blog was created by the general public. The case of sina.com shows that the general public in China attempt to circumvent the official's one-way risk communication by resorting to the Internet. However, public participation is still monitored by the Internet police, who can delete politically sensitive posts. For instance, Sina lists a blog post titled "Beihang Student: Mourn the Young Life Taken Away by H1N1 Flu" on the webpage of "Bloggers Witness". However, when clicked upon, the link leads to a message saying that the page has already been removed or deleted.

Tactical Use of Social Media by the Public in the Case of a Local H1N1 Flu Outbreak

During and after the H1N1 outbreak in the military training base of Beihang University in October, the official media offered little coverage about the incident. However, students resorted to social media such as renren.com and Internet discussion forums to share their insights and experiences of the outbreak, which eventually resulted in some change in the official responses to the outbreak.

On October 27 2009, a freshman from Beihang University died in a local cluster H1N1 flu outbreak in the Beijing Military Training Base during a mandatory military training for more than 3,000 Beihang University's freshmen. The outbreak started on October 22 when a group of students develop flu symptoms. From October 22 to October 27, 71 students developed fever and 28 were tested positive for H1N1 virus. After

the student's death, the military training was cancelled and all students were sent back home for quarantine.

Right after the incident, mainstream media reported about official policies, efforts and achievements. However, students broadly utilized social media not only to reveal their personal experiences during the military training but also to question and criticize the university policies and reactions. Many questions were raised about the causes of the cluster outbreak, the abnormal time arrangement of the military training, and the reaction of the university after the flu outbreak. With a strong online presence, students managed to intervene in the official discourse and to change the decision making process.

Official Coverage of the Outbreak in the Mainstream Newspapers

The first official news report from Xinhua News Net was titled "One student from Beihang University died of H1N1," which came out on October 28. It stressed that students' flu conditions were stable and highlighted official efforts to prevent and control the H1N1 flu outbreak. On the next day, another Xinhua News report titled "Official disclosure of inside information of Beihang H1N1 flu outbreak" was released, which announced that the Propaganda Department of Beihang University explained that the military training for freshmen had been originally scheduled on the first summer vacation. However, to host the 11th Challenge Cup, a national college academic and scientific competition from October 22 to November 4, the university decided to send the freshmen to the Beijing Military Training Base in order to vacate their dormitories and to provide affordable accommodation for the coming participants. 3108 students and 57 leading cadres were sent to the Beijing Military Training Base on October 22. Besides this background information, the rest of the report emphasized the controlled situation and future treatments for all the students at Beihang University.

From the perspective of risk communication, this news report tried to provide more clarification and to assuage the public fear.

Another news report from *China Daily* on October 29 titled “H1N1 claims first Beijing victim” indicated that “a staff member, who was unaware of the death, told *China Daily*’s METRO on condition of anonymity that the school [might have tried] to play down the H1N1 outbreak because of the competition.” On the same day, several journalists from different newspapers went to the Military Training Base to investigate the incident. However, they were not allowed to interview students and officials. Two journalists complained that “the leading group for epidemic prevention and control could not be reached,” (Guan, 2009) and that “reporter could not interview students and the Propaganda Department in Beihang University hasn’t responded to this incident” (Zhang, First H1N1 victim, 2009).

Contesting Discourses Composed and Published by Students in Social Media

The traditional news media offered very limited coverage about the Beihang H1N1 flu outbreak because of official restraints and pressure. Beihang freshmen began to write about their personal experiences during the outbreak of H1N1 flu in the military training base and widely disseminated the articles via personal blogs, discussion forums and social networking sites after they were sent back home on October 28. Dissatisfied with the official discourse, the students tried to reveal their inside knowledge about the outbreak in order to participate in, if not intervene in the risk communication and decision making process.

The first article titled “A diary of Beihang student: The truth of the H1N1 flu outbreak and the dead student” was published on Oct 29 on the school electronic bulletin boards (BBS) of Beihang University. Challenging official narratives, the student directly blamed the school for changing the military training arrangement to host the Challenge Cup and criticized its inadequate treatment of the sick students after the flu outbreak. According to this post, after the flu outbreak started on the third day of the training, students were still required to continue their military training until the sixth day. Students had no access to mobile phones or the Internet in the training base. Offering detailed descriptions of students’ daily experiences from October 22 to October 28, 2009, this post revealed all the decisions made and actions taken by the university and Beijing Military Training Base during and after the flu outbreak, which challenged numerous claims made by the authorities about the incident. This article immediately attracted widespread attention online. Many more students began to write about their experiences via different discussion forums, personal blogs and the Chinese social networking site

renren.com. Besides telling their own stories, the students also tried to analyze the decisions made by the university, asked for more in-depth investigation, and mourned for the dead student. One article compares the official narrative with the student narrative and points out several vague and fallacious arguments in official reports, urging people to go beyond “the surface because there [were] always nonsense, lies and subtexts within the official discourse in this country” (About a life and other, 2009).

At the same time, net users, particularly college students both at home and abroad began to forward and share articles and posts via their online social networks. Journalists started to write correspondent reports quoting students’ claims and make further effort to investigation of the situation. One report appeared on *Beijing Youth Daily* on October 30, 2009 and raised some of the most important questions previously posed by the students (Dialogue with Beihang). Such questions include “Why was the military training scheduled in late autumn?” and “Why was the outbreak not reported until October 26 when it started on October 22?” The journalist tried to amplify the students’ voice through the channel of traditional media; however, it ended with the same claim as other news reports: no further responses could be obtained from the officials.

The most frequently used social media tool by the students was renren.com. Formerly known as Xiaonei (Intra-school) Network, renren.com is a Chinese social networking site with an interface similar to that of Facebook. Xiaonei claimed that as of July 2008, it was “China’s largest online community website among university students” with more than 22 million active users and an estimated 40 million users who have registered their real names (Xiaonei, 2008). From October 29 to late November 2009, students used renren.com to share article, to express opinion, to criticize the government, to mourn the dead student, and to ask for more responsible and honest investigations about those university leaders accountable for the incident. A widely shared article titled “A diary of Beihang student: the truth of the H1N1 flu outbreak and the dead student” attracted 83644 views and 1147 comments. In addition, 6859 people shared it on renren.com.

Besides these articles, students also composed short poems and personal status messages, which could be quickly shared and relayed using the similar function of Twitter on renren.com. For example, such short statuses include “science and technology fly life, ‘Challenge’ makes tragedy; see the leaders in shame, hope freshmen recover soon” and “H1N1 attacks, Beihang grieves”. As a way to most quickly spread the news, students exploited the full potential of social media, in which information could be generated, disseminated and shared by every user on a real-time basis. Eventually,

students' efforts not only were recognized by the traditional media, but also gathered so much momentum that to some extent they altered the official decision making processes.

On January 8, 2010, the Beijing Food and Drug Administration released a document issued by the Beijing Public Health Emergency Headquarters titled "Decision on the Beijing Military Training Base responsible for the H1N1 flu outbreak among Beihang freshmen." This document made several charges of the Beijing Military Training Base: The base didn't report to the relevant local government departments about the plan of its military training for Beihang freshmen in October; students had to go to the hospital by themselves after they got fever, and the organizers of the military training did not promptly communicate with the Daxing CDC; also, the Daxing CDC didn't report to the local government about the H1N1 flu outbreak after they confirmed H1N1 cases among student patients. On January 9, several newspapers in China reported that the Beijing Military Training Base was "fined 60,000 Yuan for the H1N1 flu outbreak among Beihang freshmen" (Wang, "The Beijing Military Training Base", 2010). These documents and news reports demonstrate the impacts of students' claims. It is worth noticing that although the official document functioned to determine who should have been held accountable for the H1N1 flu outbreak, it was not released until nearly three months after the incident.

Discussion and conclusion

Our analysis of the use of social media in risk communication about the global H1N1 flu epidemic shows that different cultures and institutions may take very different approaches in using social media to disseminate risk messages and to invite or block public participation in the risk communication and risk management processes. Different approaches of social media use are observed in our case study, namely, one-way risk communication, limited two-way risk communication, and tactical extra-institutional risk communication. In the following section, we will discuss these approaches in more detail.

Chinese Health Authorities' One-Way Risk Communication Approach

The Chinese health institutions adopted the one-way communication approach by using official websites to release risk information and educational tips in a top-down manner. Both the MOH and the CDC used their websites as strategic news release tools and invited little feedback or involvement from various publics. Attempts were made to incorporate public interaction in Chinese CDC's website, as demonstrated by the existence of a special section devoted to such functions. However, the broken links suggest the lack of

commitment and perhaps manpower to such use of the CDC's official website.

When one considers the cultural factors that contribute to the use of such one-way communication approaches, it is important to keep in mind China's unique communication structure and political systems. Mainstream newspapers and mass media are still considered "the tongue of the Party," and they function as "ideological vehicle[s] and propagandist tool[s]" to disseminate messages from power apparatuses (Zhang, 2004). It is only fairly recently that national public health institutions such as the MOH realized that they have to employ their own spokespersons to both have a consistent media presence and to better communicate to the public in health crises. Therefore, the official websites still function as traditional one-way communication tools and excludes public participation in the decision making and risk communication processes. Such exclusion can be dangerous because, without adequate access to authoritative sources of risk messages, the public will turn to less credible sources to obtain whatever information available to them to learn about the risk situations.

The U.S. Health Authorities' Limited Two-Way Risk Communication Approach

As demonstrated by our case study, social media can be employed by governmental institutions to facilitate the information flow to the public and to invite a limited degree of public participation in the risk communication process. Both the U.S. CDC and DHHS resorted to social media tools to distribute to the public real-time updates about the flu situation, official intervention strategies, and preventive tips. They also used those tools to offer instructions and guidelines to other important stakeholders such as health officials, clinicians, communities, and high-risk places such as kindergartens and schools. They went far beyond the one way communication approach taken by their Chinese counterpart by strategically incorporating components of interactivity and real-time dissemination into their use of social media. The public could learn about the H1N1 flu situation from multiple channels: they could watch Youtube videos, browse mobile CDC website, subscribe to CDC's text messaging services or RSS feeds, follow CDC in Twitter, watch or download CDC's podcasts, and post a CDC widget on a Web site or blog. They could also comment on existing blogs or videos and express their concerns.

Their use of social media was very limited, however, when one considers the extent of user participation and involvement allowed in their approach. The CDC and the DHHS employed social media as outreach tools both to reach large number of audiences and to obtain their help to broadcast important health messages. Their use of social media did allow users

more interactivity with the institutions as well as constant and open access to risk information. However, as Grabill and Simmons (1998) would argue, all audience participation takes place only after the experts and authorities have made decisions about risk management and risk communication strategies. No mechanism exists to allow public participation during the democratic decision making processes. Users' comments and responses are only respected as signs of public involvement, but they are not taken seriously as potential partners in decision making about ways to manage the H1N1 flu epidemic. Therefore, we would categorize the risk communication approaches taken by the U.S. health authorities as a highly limited two-way approach.

This limited two-way communication approach works to ensure the wide dissemination of risk messages created by experts as well the public participation in the circulation and consumption of such risk messages. Like the one-way risk communication approach taken by Chinese authorities, neither the CDC nor the DHHS provided any mechanism to allow the public to really voice their concerns during the risk assessment and policy making stages. Therefore, the two-way approach does not really empower the public by excluding them as equally valued partners in risk policy making processes.

Chinese Commercial Internet Portals: Users' Efforts for Two-Way Communication

Media commercialization started in China in the early 1990s as "market forces began to rapidly penetrate every aspect of news media operations" (Zhao 1998, 2). Commercial media such as trade newspapers and magazines as well as commercial Internet portals try to push the government's boundary by publishing politically and economically sensitive news to attract a large number of audiences. Meanwhile, media monitoring and Internet policing are still the common practice. Editors and journalists may suffer "post-publication retribution" and punishment ranging from demotion to unemployment (Zhao 1998, 21).

Compared with mainstream media and official websites, sina.com not only offered the most comprehensive coverage of the H1N1 flu epidemic in China, but also made full use of social media tools, mostly blogs, to offer alternative interpretation and evaluation of the ongoing epidemic. Doing so allowed it to gain the status of one of the most visited websites for online H1N1 flu information in China. Sina blog functioned as a platform for bloggers and browsers to describe the flu epidemic from different perspectives and to contest the official narratives about the extent and scope of local outbreaks, as in the case of the Beihang outbreak. It should be stressed that Sina allowed the dissemination of such grassroots,

alternative views because of the infrastructure offered by its blog settings rather than its original intention to challenge official narratives. Because of the large number of users and the high visibility of its web pages and blogs devoted to H1N1 flu epidemic, Sina did facilitate the quick production and circulation of user-produced risk messages and effectively called attention to the problems associated with the Beihang outbreak. When Internet police identified and deleted sensitive messages from its website or blogs, Sina silently complied instead of taking any measures to republish such messages because of its preoccupation with the need to maintain the website and make it profitable through the offering of multiple services. In this sense, we can say that it is the users who actually managed to tactically and temporarily hijack Internet portals like Sina to circumvent censorship. The power apparatuses, however, react to such subversive acts by strategically taking over the media, deleting "harmful messages," and thus regaining their control of both the media and the content published in such media.

Chinese Social Media: Subverted By Users for Bottom-Up Risk Communication

With the traditional news media controlled by the power apparatuses, little real-time risk communication took place during the Beihang H1N1 flu outbreak. Indeed, only officially sanctioned articles were published and circulated in print and online, claiming that the situation was under control and that the outbreak witnessed only one death and 28 suspected cases (Wei, 2009; Li, 2009). After the cluster outbreak of H1N1 flu, the official risk communication efforts were neither transparent nor timely. Despite the traditional media's efforts to intervene in the risk communication processes, they were largely constrained by the government regulations and tight control of risk information.

Disappointed by the lack of response from either the government or the university, students attempted both to circumvent the tightly woven official risk communication narratives and to disseminate their own contesting narratives to a large audience through the tactical use of different social media tools. They managed to hijack the conversations about the "inside truth" of the outbreak and helped to hold those who directly contributed to the event accountable. Despite students' lack of access to the Internet or even cell phones during the military training, they employed social media immediately after the military training to expose the scope of official mismanagement that eventually resulted in the outbreak. Although scattered and individually initiated, student narratives accumulated online because of the outreach potential offered by the social media and because of the large number of users who helped to spread such narratives.

Eventually their narratives worked together to boost the credibility of their overall messages about the outbreak, attracted attention from the traditional media, and eventually influenced the official decisions in persecuting those who contributed directly or indirectly to the cluster outbreak.

As shown by discussions above, social media can be employed strategically for one-way or limited two-way risk communication by institutions and experts. They can also be tactically used by the general public for bottom-up, participatory risk communication. Depending on the goals of those initiating such communication processes, social media may be incorporated differently into the overall communication approaches either to facilitate the mass dissemination of official risk messages or to send inside knowledge to the public and to tactically intervene in the official decision making processes. Therefore, for those interested in the use of social media in risk communication processes, it is important not only to examine the ways social media are employed but more importantly to evaluate the roles social media play in the decision making and communication processes. Only by doing so can we really understand how the public participate in the risk communication processes via social media.

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