THE SCULPTURE OF TICK-BORNE DISEASES MEDIA COVERAGE IN THE UNITED
STATES AND CHINA

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Tiivistelmä – Abstract

Media's ability to enhance the salience of certain topics for the public and affect governmental policy-setting processes is widely recognized. This is particularly evident in health communication, where newspapers are one of the most important sources of health information. This study compares media depictions of tick-borne disease in the United States and China, attempting to enhance newspaper influence in health information delivery in both countries. The United States and China are experiencing an increase in tick-borne diseases and have vastly different media landscapes. To investigate US and Chinese newspaper coverage of tick-borne diseases, a content analysis was conducted of four US and four Chinese newspapers. The analysis considered length, tone, chief actors, and themes present in articles covering tick-borne diseases from January 2010 to August 2015. The findings revealed significant differences between the two nations on length of the articles, chief actors portrayed in the articles, and themes present in the articles. According to Agenda setting theory, media to public communication is not one way, on the contrary, public react to the media and media coverage reflects public preferences. The data showed that tick-borne disease stories were overwhelmingly framed in a neutral way in both nations; newspapers in the US featured more celebrity-related stories compared to newspapers in China; and Chinese government controlled newspapers as opposed to the US ones have leading impact to their domestic newspapers. Generally, to shape public health behavior and reduce tick-borne disease risk, the US newspapers can frame more celebrity related stories in the report and Chinese government owned newspaper can take the initiative to cover more tick-borne disease news.

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Introduction

The promotion of fitness has brought people from sedentary work to more outdoor activities, such as camping, walking, hiking and so forth. However, when people are enjoying fresh air and lush grass, they became the targets of small insects, ticks. Ticks, commonly found in brushy or wooded areas, when finding hosts, will firmly attach to the living creature. If left untreated, livestock can be infected with chronic tick-borne diseases which include Lyme disease, Babesiosis, Anaplasmosis, Tularemia and so forth (Tickborne, 2015; Wu, Na, Wei, Zhu, & Peng, 2013). Moreover, Tick-borne diseases have been discovered throughout the world with continuous growth of human infection in the recent 30 years (Wu et al., 2013).

Lyme disease (LD), one type of tick-borne diseases, was caused by Borrelia burgdorferi, "a bacterium transmitted through the bite of infected Ixodes species ticks" (Hinckley, Connally, Meek, Johnson, Kemperman, Feldman, White, & Mead, 2014, p. 676). First observed in the 70's century, LD has turned to be the most common vector-borne disease with climbing incidence rate in the US (Diuk-Wasser, et al., 2010; Robinson et al., 2015). According to the Centers for Disease Control and Prevention (CDC), LD was reported as approximately 300,000 diagnoses each year in the US (About Lyme Disease, n.d). Diuk-Wasser et al. (2010) claimed that due to the underreport and overdiagnosis of LD, it is difficult to determine precise geographic distribution of ticks (2010). As a result, public failed to notice certain tick-active areas (Diuk-Wasser, et al., 2010).

Winston (2010) declared that only 20,000 to 30,000 illnesses are reported each year in the US owing that many doctors don't report every case, which means the actual number for LD can be even higher. In the US, the estimated number of LD infections is 10 times more than the actual reported cases to CDC in 2008 (Hinckley, et al., 2014). Moreover, it is not easy to precisely diagnose Lyme disease (Winston, 2010). Some people can be misdiagnosed with flu, encephalitis, infectious arthritis and some other illnesses because of lack of

knowledge among doctors in tick-borne diseases (Winston, 2010). In 2008, LD was one of

the ten most notifiable diseases in the United States (Hinckley, et al, 2014). Data retrieved

from Wu and colleagues (2013) showed that each year in China, there were more than 3

million people got bitten by ticks. Among them, 30,000 infected cases are reported with LD,

which if left untreated can turn into a chronic disease with symptoms of "joint stiffness, brain

inflammation, and nerve pain" (Claire, 2016). For the reason of varied climate and geography,

ticks are growing prosperously throughout the US and China (Robinson et al., 2015; Wu et al.,

2013). Nearly all the provinces and autonomous regions in China see the arise of tick-borne

diseases and the number is still climbing (Wu et al., 2013). Furthermore, infected patients

have extended from forestry workers to students, farmers and domestic workers considering

the upsurge of tourism and the damage of ecological environment (Wu et al., 2013). Great

efforts have to be made by the China government to prevent, control, and treat tick-borne

diseases (Wu et al., 2013).

Antibiotic therapy is widely acknowledged as an effective method for the treatment of

tick-borne diseases (Ignorance, 2013). However, the Centers for Disease Control and

Prevention (CDC) stressed that among patients who have received initial antibiotic treatment

of LD, 10 to 20 percent relapsed with Post Treatment Lyme Disease Syndrome (PTLDS)

with series of symptoms (Adrian, Aucott, Lemke, & Weiner, 2015). Winston described LD as

"When one family member is infected with Borrelia burgdorferi (Bb), the entire family is

affected" (2010, p. 1). In year 2009, cost for late stage Lyme disease in the US was estimated

as $18,880, which was 10 times higher than early stage ones (Winston, 2010). Retrieved data

from Adrion and her colleagues' research on people who were involved in a US commercial

health insurance, LD patients on average consumed $2,968 more than those who were not

reported with LD disease (Adrion et al., 2015).

Survey by California Lyme Disease Association (CALDA) in 2009 discovered that 35 percent of patients were not diagnosed with Lyme borreliosis till they have visited over 10 physicians (Winston, 2010). A number of 36 percent of patients claimed a lag of disease diagnosis for more than 6 years (Winston, 2010). Early-stage treatment is essential for tick bitten sufferers given that the diseases can damage the immune system causing symptoms in joints, nervous system, and heart after days or weeks post bite (Winston, 2010).

Facing the dramatic economic pressure, patients seek assistance from health insurance. Some LD patients have their insurance companies paid $50,000 or more for the entire treatment, some others have to pay part of their own bills (Winston, 2010). And the rest got rejection from insurance companies thanks to treatment guideline on LD from Infectious Diseases Society of America (Winston, 2010). In contrast to consistent attention and media reports on health insurance that are related to tick-borne diseases, few relevant coverages have been seen in China. In one news coverage discussed about tick induced death, accidental death and dismemberment insurance (AD&D) was introduce (Zhengquan, 2015). The dispute between beneficiary and insurance company focused on whether severe fever with thrombocytopenia syndrome generated death related to tick-borne disease infection, and whether tick-borne disease infection induced death should be covered by AD&D (Zhengquan, 2015). Tick-borne disease expert Yuan Chun said not till massive news reports on the diseases raised concern of local government and health office, have the public been taken serious consideration and correlated treatment drugs been listed in medical insurance (Zhengquan, 2015). Obviously, Chinese public and government have not realized the emergency of tick-borne diseases situation. This paper aims to present current US and Chinese newspaper landscape in tick-borne disease coverage to arouse attention from public, media and government, so all the involved components can work together in the prevent, control and treatment of the diseases.

Theoretical framework

The public relies greatly on media in acquiring information on technologies, medicines, and treatment (Collins, Abelson, Pyman, & Lavis, 2006). The media acts as mediator in delivering science-related issues to the public molding their perception of new science affairs (Wallington, Blake, Taylor-Clark, & Viswanath, 2010). Nevertheless, what people have read in the media can be biased. Health reports are inclined to overemphasize positive effects of medical treatments, and overlook possible side effects (Collins, et al., 2006).

In this study, we explore newspaper as the representative of mass media in structuring health news. Collins et al. argued that compared to television customers, newspaper consumers are more flexible in what to read (selection of news) and when to read (time arrangement) (2006). Besides that, the newspaper is believed to be more reliable than television media and it is widely accepted and affordable (Collins et al., 2006). Adelman and Verbrugge (2000) claimed that "newspapers do not have inherent limits on their subtopics about a disease, and this makes them a good litmus test of public concerns and interest" (p. 347). A survey conducted in Beijing, the capital of China, illustrated that 89.8 percent people viewed mass media as the main source of health-related information, in which 62.7 percent of the respondents named newspaper (Peng & Tang, 2010). Moreover, people believed that half of their health-related behavior changes are resulted from the exposure to media information (Peng & Tang, 2010). The US and China have distinctive media systems. Peng (2004) demonstrated that media is a "fourth brand of the government" and it builds up national images in international relationship (p. 55). To obtain knowledge of international affairs, the majority of American citizens rely heavily on the news media (Peng, 2004). Their perceptions of unfamiliar social reality are constructed under the foundation of news framed

by media and policymakers. Whereas media coverage is not always true and comprehensive, therefore, public's perception can be distorted (Peng, 2004).

Strong media censorship has been seen in China as large amount of press affiliated to the government as official media. In order to grasp the control of regime and society, the government does not allow free speech on the media as well as free flow of diverse information (Luo, 2013). Great efforts have been made to ensure only Communist party-allowed speeches are made to the public (Luo, 2013). Since 2009, Internet has been seen by Chinese government as the emerging domain for public opinion (Cui & Wu, 2016). Not like before when morality was strongly stressed by the Chinese government, social stability now became a new political strategy for governing the country (Cui & Wu, 2016).

Those government-controlled media served as mouthpiece of the central government in delivering latest policies and regulations (Yunjuan, 2014). Commercial media, on the other hand, has more freedom and choices in news coverage (Yunjuan, 2014). Considering mainly revenue of is from advertisements, and readers are the ultimate customers paying for that, commercial media tends to report news that caters to the public with less political issues involved (Yunjuan, 2014). Peng and Tang argued that in China, newspapers are among the most crucial health information sources (2010). People deemed one disease as urgent and prevalent according to the media, whether this disease has received recent constant media reports or framed as extremely risky. Tone, specific words, focus of report (eg., causes, prevention methods, diagnosis, treatment) in health-related news frame general diseases to the readers (Peng & Tang, 2010).

Agenda setting theory

Our study is built on the theoretical framework of agenda setting and framing to examine reporting differences upon tick-borne disease in China and the US. Agenda setting, first proposed by McCombs and Shaw in 1972 was widely used in mass communication field

in the US (Weaver, McCombs & Shaw, 2004). Since then, it became popular among scholars all over the world (Chan, 2007; Lim, 2006). Apart from media researchers, scholars from diverse academic background continue employing Agenda setting in their studies (Luo, 2013).

Mass media refers to newspaper, magazine, radio, television and the Internet, among which newspaper serves as the most important resource for health-related information acquisition in China (Miller, 2004; Peng & Tang, 2010). Decades ago, traditional media was seen as gatekeeper between the public and latest news. Media chose what to tell the public and helped them structure social reality. By emphasizing one aspect of an issue and obscuring others, media informed public what was important, thus impose their idea to the audience and lead media agenda to the public agenda (Yunjuan, 2014). In China, due to strict political control on media, few free speeches are heard. McCombs asserted that Agenda setting would not function well in China compared to other societies (eg., the US, Japan and Spain) where free speech is appreciated (Luo, 2013). Thanks to the fact that a large number of media is owned and controlled by the government, media is an ideal propaganda tool for the Communist Party of China. Luo (2013) found that after the Chinese economy revolution in the 90s, propaganda model of mass media confronted with great challenge. In response to the transform, the central government loosed the control over media, instead, it adopted the strategy of instilling ideologies to public to guiding public's opinion which is a great camouflage being indirect, disguised and hard to notice (Luo, 2013).

This study contributes to amplifying Agenda setting theory by exploring the effective Media agenda setting method in health communication within the context of the US and China. Hopefully this thesis sheds light in health communication structure in two countries that helps government and media to resolve effective ways in disseminating necessary knowledge and attracting the attention of audiences, eventually change people's health behavior.

"Medical and scientific debates about disease origins, affliction of prominent individuals, diagnostic and therapeutic breakthroughs, and sophisticated public advocacy" are motives for health reports (Adelman & Verbrugge, 2000, p. 359). Among them, prominent individuals involved in coverage attract people who care for the health affairs as well as those who have emotional attachment with celebrities. Besides "feeling", celebrities impacted public's health attitudes and behavior through media. One example is Los Angeles Lakers' basketball player Magic Johnson (Brown & Basil, 1995). After his statement of positive HIV infection, more people knew HIV/AIDS and possible consequences it brought about. Especially young adults who were fans of Johnson exposed to AIDS prevention campaign (Brown & Basil, 1995). Brown and Basil (1995) suggested in their study that celebrities can effectively promote health-related information in media as a way of persuasive communication. Because the public are more interested in their adored public figures who are related to health news than the news itself (Brown & Basil, 1995). The situation of celebrities' influence in media reports varied in China. For political celebrities, such as Wen Jiabao, Chinese prior premier, he played a highly important role in HIV/AIDS media coverage (Yu, 2006). On 1 December 2013, Wen made his appearance on public, conveying his concern on HIV/AIDS and those patients, asserting to combat against the disease. Later on, in 2014, the Chinese news audience saw a triple growth in HIV/AIDS coverage compared to 2012 (Yu, 2006). As for entertainment celebrities when involved in health campaign received rather few media attention (Yu, 2006). Whereas celebrities may not able to change public's perception in risks of certain diseases and eventually reduce unsafe behavior (Yu, 2006). Yet, they are favorable in disease prevention as public are more likely to correct their attitudes and behavior in the influence of emotional attachment with celebrities instead of knowledge of pure illness facts (Yu, 2006).

Adelman and Verbrugge (2000, p. 347) stressed that "death make news". However prevalent and high in incident trends, one disease will not attract much media attention if the mortality rate was comparatively low (Adelman & Verbrugge, 2000). Tick-borne diseases have the chance to become chronic, and people with these diseases are six-fold more than those diagnosed with HIV/AIDS in the US every year, while the mortality rate of tick-borne diseases are not high in contrast with cancer, heart disease, and diabetes (About Lyme Disease, n.d.; Adelman & Verbrugge, 2000).

In many times, under the competition of newspaper rooms, health editors and journalists gave more space and coverage to eye-catching and popular health issues that appeal to public (Peng & Tang, 2010). Whereas some diseases, though rarely show on the media, have high risks to human beings, if underreported, public can raise wrong perception of those illnesses which makes them more vulnerable (Peng & Tang, 2010). In addition to newsroom competition, "political pronouncements, public health burdens, national costs of disease, legal proceedings, research findings, and others" are the stimuli for health coverages (Adelman & Verbrugge, 2000, p. 348). Top newspapers (eg., New York Times) are inclined to have fundamental influence to other media, and those predominant media set the agenda for other media institutions (McCombs, 2005). Study by Luo has showed that in the interaction of media agenda and public agenda, the former has stronger impact to the latter, in other words, public agenda seems to be less effective in altering media agenda than media agenda does to it (2013).

The public change their lifestyle towards a positive way in response to media reports on health issues (Peng & Tang, 2010). By prioritizing certain health information, the media sets the agenda for the public on perceiving the most urgent health issues of the time. Oten (1992) noted that though the media was not aware of the negative effects of smoking in the past years, the public did change their lifestyle due to the intensive exposure to smoking

reports. The theory of agenda setting delineating media sets the agenda for the public of what to think and how to think about it by emphasizing certain issues and particular aspects of the issues (Miller, 2004). In the field of health issue reporting, media usually set the agenda in according to the real-life health and medical situation, while still, some diseases are downplayed (Peng & Tang, 2010). For instance, Peng and Tang asserted what were considered as emergent diseases by the Ministry of Health were not given priority in newspapers from time to time (2010). One example of AIDS reflected the influence of media agenda on the public. In the early 19 century, HIV or AIDS was downplayed by the media, therefore the public underestimated the disease and its risk as it was not the prominent concern in the media (Peng & Tang, 2010). Report facets of health news favored by journalists are causes and prevention methods. Disease origins are more salient and frequently included than prevention methods in health articles (Peng & Tang, 2010). Miller (2004) claimed human beings are not omniscient about everything, thus it is the "need for orientation" that leads people to depend more on the media for information and consequently, the public are more likely to be influenced by the media (p. 261). Especially in delivering scientific and health-related knowledge, media plays the role of mediator in it (Peng & Tang, 2010; Wallington et al., 2010). There are two circumstances of "need for orientation". One is personal relevance with the news, the other is uncertainty level to unknown issues. Higher relevance and higher uncertainty require higher need for orientation, vice versa. McCombs gave an example of president election (2005). Public who desired to vote in the election found related news appealing, because it is relevant to them and during the election, uncertainty emerged all the time (McCombs, 2005). Luo (2013) argued that Agenda setting research in China were rarely designed as empirical studies, instead, most scholars interpret research results subjectively. In contrast, western scholars promote empirical study which is

more convincing considering its objective and quantitative data (Luo, 2013). Agenda setting

effects can be seen from the quality and quantity of news reports (Collins, et al., 2006).

Though substantial impact has been seen through media agenda to public agenda,

Collins and colleagues suggested that "Agenda setting processes are dynamic" (2006, p. 90).

This implies that public does not advocate constant attention to media selected salient issue.

Rather, "issue-attention cycle" is witnessed (Collins, et al., 2006, p. 90). Media concentrates

on one issue with considerable coverage in a short period of time, public then will respond

accordingly to the issue. Later, the issue stepped out of public attention after reaching the

peak of coverage (Collins, et al., 2006). s

Framing

To meet the goals of convincing readers of what to consider, journalists modify

stories imperceptibly in health and medical news reporting (Wallington, et al., 2010). News

frame is delineated as "simplify, prioritize and structure the narrative flow of events" (Peng,

2004, p. 57). Lee (2014) contended that two framing strategies are employed in health

communication research. One is issue-specific frame which focuses on the micro view of

certain health-related problems. Another is generic frame. It examines a broad range of social

and individual issues. The empirical study by Wallington, Blake and Viswanath (2010) drew

the conclusion that there are certain factors leading to framing strategy of journalists and their

desired reporting angle in shaping news coverage. Some of the journalists pay more attention

to human interests and controversial news information, while others find reports digging in

economic aspects favorable ((Wallington, et al., 2010). Lee (2014) demonstrated that media

framing selects certain aspects of health issues, for example, diseases, causes, morality

criticism and treatment solutions. Framing in health communication is to some extent, owing

to the fact that many of the journalists lack the necessary knowledge for medical reports, thus,

they have to reply on the "frame sponsors", who are hospitals, government agencies and

others (Lee, 2014). AIDs was not given adequate attention in the early ages, while exceptions were made when celebrities, such as "Arthur Ashe" and "Magic Johnson" were infected with HIV ((Brown & Basil, 1995). Given that newspapers are confronted with online media, a fierce rival, in order to boost sales, newspapers tend to have more tabloidization news which makes it reasonable to have celebrity related news (Collins, et al., 2006). The selected topics and aspects of an issue are usually determined by their attractiveness to public attention under the competition of newspaper room (Peng & Tang, 2010).

Three concepts were posed in evaluating salience of media framing, namely, attention, prominence and valence (McCombs, 2005). The first two concepts are categorized as external characteristics and the last one is regarded as internal characteristic. In most of the Agenda setting studies, scholars have looked into attention which implies the quantity of media coverages of certain issues (McCombs, 2005). Prominence stands for how much newspaper room press has spared to particular topics, and the timeline of coverage or size of headlines. The other concept Valence refers to, for example, "the amount of conflict in a story" or positive and negative tones (McCombs, 2005, p. 550).

Coleman, Thorson and Wilkin argued that diseases, natural disasters, economic crisis are all listed in the realm of negative news (2011). There are two ways of how the media frames negative news. The first way is called "thematic" approach, which analyses problems as a result of comprehensive social outcome (Coleman, Thorson & Wilkin, 2011). The second way is "episodic". In this approach, media attributes more to individuals who are supposed to take the responsibility (Coleman, Thorson & Wilkin, 2011). How negative news are covered determines which key actor the public will blame. Compared to "episodic" coverage, the public blames more on the society in "thematic" reports (Coleman, Thorson & Wilkin, 2011). In this case, when it comes to revolutions in legal policies, laws, regulations

and so forth, people are more willing to support the changes (Coleman, Thorson & Wilkin, 2011).

Facing the emergency situation of tick-borne diseases in both the US and China, it is crucial that we look into how these diseases are pictured in the media; as media plays a vital role in raising awareness of potential health risks and cultivate people's perception of critical health issues (Peng & Tang, 2010). However, little media research has been done to analyze tick-borne disease coverages and how two different media systems in the US and China influence health-related reports. Or some of the research provide China-only perspective (eg., Xian-Bo, Ren-Hua, Shan-Shan, Jin-Song, & Hong-Juan, 2013) or the US-only perspective (Diuk-Wasser, et al., 2010), and they discussed exclusively in bioscience field, for instance, distribution and attribution of tick-borne diseases. Neither of the studies introduced media prospect. Moreover, inadequate empirical research exists to discover distinctive countries in health coverage disparities on one certain health issue. Known as what is pictured as the most pressing health problems may not be the real alarming issue in the government official department of health (Peng & Tang, 2010). Furthermore, medical news often overemphasizes the positive effect of medical treatment and downplay the possible negative consequences (Collins, et al., 2006). Peng and Tang noted that in three consecutive years, "iodine deficiency disorders, plague, cholera, rabies, brucellosis, and malaria" were listed as top crucial diseases worth noticing, while none of the upon mentioned diseases received enough attention by the media (2010, p.707). One attribute to the situation is that many of the diseases are more prevalent in rural areas, while main readers of metropolitan newspapers are from urban regions. Urgent health issues in countryside are hardly relevant to them (Peng & Tang, 2010). Confronting various upspring diseases, the government and health advocates launched health campaigns to encourage healthy lifestyle and behaviors (eg., tobacco control advocacy). Media campaigns, viewed as effective communication practice for promoting

health issues can adjust people's behavior. In most circumstances, health campaigns adopted "education" strategy through which sponsors conveyed disease related knowledge to individuals so that they would know the risks and possible disease prevention means (Apollonio & Malone, 2009). However, sufficient knowledge on certain diseases does not necessarily mean that individuals will change their behavior to avoid disease risks. It is the "feeling" that people hold towards health consequences affects behavior more than knowledge (Apollonio & Malone, 2009).

Method

The purpose of the study is to examine media depiction of tick-borne diseases under the different media landscape of the US and China, through an empirical study of tick-borne disease courage from January 2010 to August 2015. For this purpose, a content analysis was conducted which is operated to "systematically describes, categorizes and/or makes inferences about communication messages" (Croucher & Cronn-Mills, 2014, p.206). As pointed out by Luo (2013), content analysis is the most commonly applied method to study the relationship between media agenda and public agenda.

To obtain a broad and comprehensive view, we accessed four US and four Chinese newspapers. For the US content, namely, *Los Angeles Times* (LAT), *The Washington Post* (WP), *The Wall Street Journal* (WSJ), and *The New York Times* (NYT), for Chinese content, *People's Daily* (PD) and *China Youth Daily* (CYD), *Bandao Metropolis Daily* (BMD) and *Yangtse Evening News* (YEN) were taken into analysis. In the consideration of newspaper selection, we first planned to have only national newspapers in both countries to ensure that we have involved a comprehensive view from the whole country. Then, regional newspapers came to our sight, though those newspapers are less powerful in influencing a wide range of people, they are comparatively aggressive in the impact of setting the agenda of public in specific regions (Bandao News, 2012). Geographic proximity makes them more appealing to

readers given that focus of regional newspapers is local affairs which are more influential to public's daily life.

The US data was retrieved from Proquest database where latest centuries of newspapers worldwide have been captured (Proquest, n.d.). For Chinese data collection, because there was no such database, we managed to search by key words through each individual website. To search for relevant news, we applied keywords: tick, tick-borne diseases, Borrelia, and Lyme. Every piece of news if only contained the abovementioned keywords in titles or full contexts will be included in the sample. In fact, we originally came up with key themes as pesticide, tick information and education, notice of tick danger, health policy and etc. Given that new themes continued to emerge, we decided to specify some of the themes and classify duplicated ones. Instead of stating "tick information and education" which is obscure and vague, we separated it to two themes, "what is Lyme and how to protect yourself" and "Notice of Lyme spreading". In some cases, more than two themes were observed in one article, we then decided that what has been primarily discussed would be the theme. Same applied to how we determined key actors.

Three coders were involved in the coding process, two of them including the author were native Chinese speakers who were responsible for Chinese newspaper coding. The author was also engaged in the coding of both the US and Chinese newspaper to ensure the congruity of it. To achieve intercoder reliability, two rounds of pilot study was conducted. 10 articles each from both US and Chinese samples were selected and 3 coders work independently on coding, then we compare the results. Discrepancy was solved after discussion. We considered frequency distributions, independent samples t-tests, and Pearson's chi-square analyses into our statistical analysis.

The study is written under the premise of agenda setting and framing, focused on how media reports tick-borne diseases in the US and China, specifically, coverage tones, themes

and key actors. A coding Excel sheet is developed, which include coder number, article publishing date, article length, article tone, article actor, article title, article theme and article name. Among them, we focus on length, tone (positive, negative, neutral), actors (government, medical, celebrity, public, other) and theme (what is Lyme and how to protect yourself, celebrity with Lyme, metaphor and smiles and etc).

Results and Conclusion

Generally, tick-borne diseases related news was framed in neutral tone both in the US and China. However, one Chinese newspaper People's daily drew our attention, neutral ($n =$ 340), negative ($n = 21$), and positive ($n = 27$) light; χ^2 (6) = 9.94, $p < .01$. Obviously, People's Daily seemed to have more freedom in expressing its standpoint. Fu and colleagues argued that People's daily is heavily monitored by the Chinese government, consequently it serves for the government and the Communist party as the channel in delivering political, economic, social and cultural events (Fu, Zhou, Zhang, Chan, & Burkhart, 2012). By framing news in different tones, People's Daily presents official attitudes from the government. Then, regional and commercial media drew the signal and reported news accordingly (McCombs, 2005). In the context of tick-borne diseases, like other heath news in China, media agenda is undoubtedly influenced by policy agenda. Wen Jiabao, Chinese previous premier, made his speech about combatting AIDs which has received significantly more coverage compared to other celebrity-involved AIDs campaign reports (Yu, 2006). In a word, the effective approach to raise media concern on certain diseases in China is to have policy agenda influence over media agenda which in turn impact downstream public. Among media who sets the agenda for the public, it is the leading media, usually those controlled by the Chinese government and the Communist Party that has the most prominent impact upon others.

Medical and scientific actors were most frequently noted in Chinese newspapers ($n =$ 371, 66.4%), compared to the US ($n = 135$, 36.7%) as well as public actor, with 9.1% and 1.6%

respectively in China and the US. One actor that occupied 22% of tick-borne disease coverage in the US was celebrity, while only 6.4% was seen in China. With respect to newspaper report theme, 12 themes emerged in US newspapers and 10 themes emerged in Chinese newspapers, in which 9 themes overlapped, specifically, pesticides, notifications about disease spread, pets and Lyme, passing mention of tick-borne disease, animals (not pets) that carry Lyme, celebrities with Lyme, ways to profit from Lyme, diagnosis, and metaphors and similes about Lyme. Two themes that exclusively appeared in US newspapers were health and governmental policies about Lyme, climate and Lyme, one theme solely showed in Chinese newspaper was government/official misconduct.

The US newspapers feathered more celebrity-related stories than those in China. Second level of Agenda setting, framing indicates how journalists frame news attempting to modify the way public think. One strategy that appeals to some journalists is focusing on themes that meet human interests (Wallington, et al., 2010). The reason why media covers celebrity related news is that famous people are socially influential and attractive to the public (Brown & Basil, 1995). The public on the other hand are emotionally involved with celebrities and tend to imitate and be like the stars (Brown & Basil, 1995). Media agenda to public agenda affect appears to be powerful in the US when celebrity involved stories are framed. Thus, to keep the US public alerting of tick-borne diseases, celebrity framed story can be adopted by the media to draw more attention from the public.

Peng and Tang (2010) urged future studies should compare health reporting between the US and China, as culture can be a social determinant. This study answers that call by exploring the newspaper coverage of tick-borne diseases in the US and China. Newspapers in both nations overwhelmingly framed tick-borne diseases in a neutral way. However, as the mouthpiece of Chinese government, PD was able to express more frequently in a negative or positive tone than other Chinese domestic newspapers. Furthermore, newspapers in the US

tend to feature more entertaining celebrities in tick-borne disease stories owing that the involvement of the celebrities in health stories is more effective in the US than in China.

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The sculpture of tick-borne disease media coverage in the United States and China

Tang Yanzhe, Zeng Cheng, Stephen M. Croucher, Leona Gilbert, & Diyako Rahmani

Abstract

Media's ability to enhance the salience of certain topics for the public and affect governmental policy-setting processes is widely recognized. This is particularly evident in health communication, where newspapers are one of the most important sources of health information. This study compares media depictions of tick-borne diseases in the United States and China. Both countries are experiencing an increase in tick-borne diseases and have vastly different media landscapes. To investigate US and Chinese newspaper coverage of tick-borne diseases, a content analysis was conducted of four US and four Chinese newspapers. The analysis considered length, tone, chief actors, and themes present in articles covering tick-borne diseases from 2010-2015. The findings reveal significant differences between the two nations on length of the articles, chief actors portrayed in the articles, and themes present in the articles. The data also show: tick-borne disease stories were overwhelmingly framed in a neutral way in both nations; newspapers in the US featured more celebrity-related stories compared to newspapers in China; and US stories as opposed to those in China focused more on health policies.

Keywords: Agenda setting, health care, content analysis, Lyme disease

The ability of media to enhance the salience of certain topics for the public and affect governmental policy-setting processes is widely recognized. This is particularly evident in health communication, as newspapers are one of the most important sources of health information for the public on salient health issues (Peng & Tang, 2010). The current study aims to compare media depictions on one salient health issue: tick-borne diseases (such as Lyme disease or neuroborreliosis). Specifically, this study compares media depictions of tick-borne diseases in the United States and China. Lyme disease is a multisystem illness caused by *Borrelia burgdorferi*, a member of the spirochaetes family of bacteria, mostly prevalent among children aged 2 to 15 and adults aged 30 to 59 years of age (Marques, 2010). Early diagnosis is crucial; otherwise the disease can cause serious damage to the heart and nervous system (Depietropaolo, Powers, Gill, & Foy, 2005). However, there is debate over the long-term effects of the disease. While some health care professionals believe tick-borne diseases, such as Lyme are chronic diseases with different stages (Adrian, Aucott, Lemke, & Weiner, 2015; Depietropaolo, Powers, Gill, & Foy, 2005; Logigian, Kaplan, & Steere, 1990), others believe the diseases are non-chronic and do not recommend extended antibiotic therapy to treat it (Baker, 2010; Wormser, 2006). In recent years, tick-borne diseases have received more attention due to the rising number of global cases (de Carvalho & Núncio 2006; Hinckley, Connally, Meek, Johnson, Kemperman, Feldman, White, & Mead, 2014; O'Connell, Granström, Gray, & Stanke, 1998), and rising societal burden (Adrion et al., 2015; CDC 2013).

Both the US and China are experiencing an increase in tick-borne diseases and have vastly different media landscapes, which may result in covering these diseases differently and ultimately impacting citizens' perceptions of tick-borne diseases. Cross-cultural media research has found significant differences between the US and China in terms of reporting on key public issues, such as disasters (He & Tiefenbacher, 2015), censorship (Chun & Mastin,

2014), war (Jin, 2008), climate change (Xie, 2015), and health/medical issues (Peng & Tang, 2010). As media plays a central role in disseminating health information and influencing people's health beliefs, it is thus crucial to explore the difference in newspaper coverage of tick-borne disease in the US and China.

Agenda setting

Agenda setting as a concept was originally introduced to explain the influence of news media on public opinions (McCombs & Shaw, 1972). Three main components involved in the Agenda setting process are: media agenda, public agenda, and policy agenda. After deciding the salience of the issues, media communicate with the public and affect how people think about the issues. Then, the public pushes the policy makers to set the policy agenda accordingly (Matsagani, & Payne, 2006). The process of constructing a social agenda through the interplay of the media, the public, and the government is conceptualized as "agenda building" (Lang & Lang, 1981).

Studies on the transfer from media agenda to public agenda were typically conducted by communication scholars while political scientists have been more interested in how the public influences the policy agenda (Luo, 2013). During the last four decades, two levels of agenda setting have received significant attention (Luo, 2013). The first level of agenda setting focuses on the transfer of the salience of issues (the "objects") from media agenda to public agenda, whereas the second level of agenda setting argues the salience of attributes of issues (the "attributes") can also be transferred from media agenda to public agenda. In this sense, media not only tell people what to think about but also how to think about it (McCombs, 2005). Despite the similarity, scholars typically consider the second level of agenda setting as different from framing as frames can be seen as one attribute and not all attributes are frames (McCombs, 2005). In an attempt to build on the existing two levels of agenda setting, Lei, Hong Tien, and McCombs (2012) explored the third level of agenda

setting by developing the Network Agenda Setting Model, which argues "news media can bundle different sets of objects or attributes and make these bundles of elements salient in the public's mind simultaneously" (p. 15).

Not only does media agenda affect the public agenda, media's influence on each other is evident. Intermedia agenda setting argues the content of the flagship media is likely to be mirrored by other media (McCombs, 2005). For example, Reese and Danielian (1989) demonstrated *The New York Times's* coverage on drug uses was followed by *The Washington Post* and *The Los Angeles Times*. Issues presented in the media have different impacts on public agenda. Roberts, Wanta, and Dzwo (2002) found immediate Agenda setting effects on issues of immigration, several days of time lag of Agenda setting effects on issues of health care and taxes, and no Agenda setting effects on abortion issues. Soroka (2002) argued issues are likely to have more intensive Agenda setting effects when they 1) affect a minority group, 2) have been significantly covered over a short time-frame, 3) are concrete instead of abstract, and 4) are dramatic. In addition to the difference of Agenda setting effects among different issues, individuals also respond to media agenda differently. People with higher need for orientation are more likely to be influenced by the media agenda (McCombs & Shaw, 1972). In this study, tick-borne diseases do affect a minority group of people if compared to national population (unobtrusive), concrete and dramatic (possibility of turning into chronic and debilitating disease) where public dependence on media for information is high.

Traditionally, the agenda setting process was seen as a unidirectional process focusing on the influences news media have on public agenda (Rosen, 2006). Later, the interactive relationship between media agenda and public agenda became more prominent as a result of netizens being empowered by the Internet. Instead of merely being the passive information receivers, today people tell media what they want to think about (Yunjuan, 2014).

Agenda setting in the health context

Historically, the focus of the Agenda setting research was on political issues (Ogata Jones, Denham, & Springston, 2006). As the influence of media on public opinions became more and more apparent, scholars have started to apply Agenda setting theory to study other issues, including health-related behaviors (Ogata Jones et al., 2006). Media as a powerful tool of reaching the public has been widely used in health campaigns. Various media campaigns on public health issues such as obesity, smoking, alcohol, and drug use, as well as STD/AIDS were witnessed worldwide (Apollonio & Malone, 2009). Media campaigns have been confirmed effective in terms of promoting healthy behaviors. For example, a campaign called "Hombres Sanos" was launched to promote health sexual behaviors among bisexual Latino men in the US in 2006. 87 percent of the target audience reported exposure of the campaign. In addition, out of the exposed audience, 20 percent stated they have started to use condoms and another 20 percent have sought an HIV or STI test (Martinez-Donate, Zellner, Sañudo, Fernandez-Cerdeño, Hovell, Sipan, & ... Carrillo, 2010).

Both similarities and disparities are apparent between US and China in terms of how health-related stories are covered in mass media. The majority of citizens from both nations claimed mass media serve as their main source of health related information (Brodie, Hamel, Altman, Blendon, & Benson, 2003; Liu, Yao, Lin, Jia, & Zhang, 2003). Research also illustrated the coverage of diseases in US and Chinese newspapers were more related to their mortality rates rather than incidence rates (Adelman & Verbrugge, 2000). Moreover, health problems of high mortality and morbidity in China received significant coverage in newspapers (Peng & Tang, 2010). Certain diseases such as AIDS and other transmitted diseases (STDs) have been receiving significant coverage in US for years, however are underreported in China (Yu, 2006).

Framing in the health context

Framing primarily concerns "how" the issues are reported and discussed. To meet the goals of convincing readers of what to consider, journalists modify stories imperceptibly in health and medical science news reporting (Wallington, Blake, Taylor-Clark, & Viswanath, 2010). Lee (2014) contended two framing strategies are employed in health communication research. One is issue-specific frame, which focuses on the micro view of certain health-related problems. Another is a generic frame. It examines a broad range of social and individual issues. The empirical study by Wallington, Blake, Taylor-Clark and Viswanath in 2010 drew the conclusion that there are certain factors leading to framing strategy of journalists and their desired reporting angle in shaping news coverage. Some of the journalists pay more attention to human interests and controversial news information, while others find reports digging in economic aspects favorable. Lee (2014) demonstrated that media framing selects certain aspects of health issues, for example, diseases, their origins, morality criticism, and treatment solutions. Framing in health communication is partially owing to the fact that many journalists lack the necessary knowledge for medical reports, thus, they have to reply on the "frame sponsors", who are hospitals, government agencies and so on (Lee, 2014). The selected topics and aspects of the issue are usually determined by their attractiveness to the public attention under the competition of newspaper room (Peng & Tang, 2010). One of the sets of frames is emphasis on benefit vs. emphasis on cost (Kahneman & Tversky, 1984). Brashers, Goldsmith and Hsieh (2002) found health related issues in Chinese newspapers are likely to be reported in a neutral way as using a negative tone may stir anxiety in the public.

A specific health topic can be disseminated in various ways, which may have different public influences (Peng & Tang, 2010). This is particularly evident in a global context. Presenting detrimental risks to public health, tick-borne diseases have garnered much attention recently due to increasing incidences worldwide, and to increasing global health costs (Xian-Bo, Ren-Hua, Shan-Shan, Jin-Song, & Hong-Juan, 2013). The epidemiology of

tick-borne diseases, including host availability, vector abundance, and pathogen transmission, is closely associated with various environmental factors (Robinson, Neitzel, Moen, Craft, Hamilton, Johnson, & ... Pelican, 2015). The US and China suffer greatly from tick-borne diseases due to their large geographic territories, diverse landscapes, and climate conditions (Robinson et al., 2015; Xian-Bo et al., 2013). Mass media has been employed to aid in dissemination of information about tick-borne diseases in both nations. However, the media coverage on tick-borne diseases, a major role in informing the public and policy makers, and facilitating public opinions about the diseases, has not been studied. In the present study, we are interested in examining and comparing the newspaper coverage of tick-borne disease in the US and China to gain a greater understanding of how the media in both nations influence people's knowledge about tick-borne diseases. Following a framework developed by Iyengar (1997), and adapted by Collins Abelson, Pyman, and Lavis (2006), we explore the representation of tick-borne diseases in US and Chinese newspapers. Specifically, we pose the following three research questions:

RQ1: In what way does the tone of US and Chinese coverage of tick-borne disease differ?

RQ2: Who are the key actors discussed in US and Chinese newspaper articles about tick-borne diseases from 2010 to August 2015?

RQ3: What are the key tick-borne disease themes discussed in US and Chinese newspapers from 2010 to August 2015?

Method

Quantitative content analysis was applied in this study. To find the most current pattern of tick-borne diseases coverage in the US and China, news articles from January 2010 to August 2015 were analyzed. The keywords for article selection were: tick, tick-borne diseases, Borrelia, and Lyme. Articles that contained any of the aforementioned keywords were

included in the analysis. The US newspaper reports are collected from Proquest database, which owns millions of pages of international, national and regional newspapers (Proquest, n.d.). For Chinese newspapers, samples are retrieved from their respective electronic versions.

Newspaper selection

The four newspapers from the US selected for this study were: *Los Angeles Times* (LAT), *The Washington Post* (WP), *The Wall Street Journal* (WSJ), and *The New York Times* (NYT). The NYT along with and the WP are major national newspapers (Weber, 2014) and the WSJ has the highest circulation in the US (Top ten, 2014). The LAT is a prominent daily on the west coast (Haigh, 2014). These four newspapers are also among the top 5 high circulation dailies in the US (Top ten, 2014). However, these dailies have different policies and ideologies in dealing with news stories. While the NYT has a more liberal attitude in dealing with issues such as environmental problems (Castilla, Rodríguez, & Quesada, 2014), the WSJ takes a more conservative ideology, publishes op-eds skeptical of global warming for example (Cook, et al, 2013). The WP also has a conservative approach (Porpora, Nikolaev, & Hagemann, 2010). The LAT is an influential and prominent newspaper with a more moderate approach (Peng, 2004).

Two kinds of media co-exist in China: state-controlled "party organs" and "market-oriented 'mass appeal media" (Chan, 2003). Historically, all Chinese newspapers were owned and controlled by Chinese government. Commercial newspapers started to emerge three decades ago at the end of China's planned economy era, which are responsible for their own profits and losses. Today, national newspapers in China are typically state-controlled, conservative, and serve as the mouthpiece for the ruling Party. On the other hand, local commercial newspapers have more autonomy over their contents and are generally more diverse and assertive (Massey & Luo, 2005). To examine representative newspapers in China, two national newspapers, *People's Daily* (PD) and *China Youth Daily* (CYD), and two

local daily newspapers, *Bandao Metropolis Daily* (BMD) and *Yangtse Evening News* (YEN). PD, one of the world's top 10 most circulated newspapers, serves as a leading key conduit of official interpretations of political, economic, social, and cultural events in China (Fu, Zhou, Zhang, Chan, & Burkhart, 2012; Lynch, 1999). CYD is the first for-profit governmental newspaper and its daily circulation exceeds one million in over 40 countries and regions (China Youth Daily Blog, 2005). BMD is the most influential newspaper in Northeast China with a circulation of 1.15 million in 2012 (Bandao News, 2012). In 2010, YEN had a daily circulation of 1.74 million, which was the fourth largest among Chinese newspapers (Yangtse Evening News, 2010).

Coding of articles

Coder training and interceder reliability

Three coders were working in two teams separately coding newspapers from the US and China. The first author was involved in both teams to ensure congruity in the coding process. The coding protocol was developed from two rounds of pilot tests. Cohen's kappa (κ) was used to assess intercoder reliability, κ = .84 and .81 for coding the US and Chinese newspapers. All discrepancies were discussed and resolved among coders. Each article was coded to assess agenda setting, informer, and framing effects. To accomplish this, all articles were coded on the following basis: date, length of article, tone of article, main actors in article, and theme of article.

Article tone

Article tone was determined according to how tick-borne disease stories were framed. Articles with a positive tone typically reported successful control of an outbreak of tick-borne diseases or breakthroughs in diagnosing or treating tick-borne diseases. Articles for example raising criticism against the health system or government policies on tick-borne diseases were

coded as having a negative tone. Articles that did not clearly employ a positive or negative

tone were coded as neutral.

Key actors

The key actor in each article was based on the key individual(s) who were the focus of the

article. The key actor was coded based on the following: medical, government, celebrity,

public, and other. The most prominent actor in the article would be coded when multiple

actors were mentioned.

Themes

Articles were inductively coded into 13 categories/themes based on the emergent content

within the articles (Neuendorf, 2002). Codes were based on: (1) diagnosis, (2) what is Lyme

and how to protect yourself, (3) celebrity with Lyme, (4) health and government policies, (5)

notices of Lyme spreading, (6) passing mention of Lyme, (7) climate and Lyme, (8) animals

(not pets) that carry Lyme, (9) pets with Lyme, (10) metaphors and similes about Lyme, (11)

pesticides to kill ticks, (12) official (government and health etc.) misconducts, and (13) ways

to profit from tick-borne diseases. The ordering of the themes is not related to the

significance of the themes. See Table 1 for further information regarding article

characteristics by newspaper.

Table 1

Article Characteristics by Newspaper

	LAT	WP	WSJ	NYT	PD	CYD	PMD	YEN
Total number of articles	27	185	57	99	389	86	66	20
Average length of articles	852.48	991.37	912.61	890.56	1101.37	1427.56	1305.50	1246.50
Tone								
Positive	2	3	3	3	27	1	1	0
Negative	7	12	10	5	21	6	0	0
Neutral	18	170	44	91	340	78	65	20
Key Actor								
Government	7	61	10	8	32	35	24	2
Medical	8	62	23	42	316	22	24	9
Celebrity	10	19	4	27	7	0	0	1
Public	0	1	0	5	3	25	16	7
Other	2	42	20	17	30	3	2	1

	LAT	WP	WSJ	NYT	PD	CYD	PMD	YEN
Themes								
Diagnosis	4	18	11	8	2	2	0	0
What is Lyme and how to protect yourself	4	14	3	4	257	49	51	14
Celebrity with Lyme	7	18	4	27	6	0	0	1
Health and Government policies	3	32	4	6	0	0	0	0
Notice of Lyme spreading	1	9	3	6	10	14	1	1
Passing mention	4	41	14	19	7	6	0	0
Climate and Lyme	0	1	0	2	0	0	0	0
Animals (no pets) that carry Lyme	0	37	11	22	12	0	0	0
Pets and Lyme	0	6	0	3	12	4	4	4
Metaphors and Similes	1	2	0	2	2	1	0	0
Pesticides to kill ticks	0	5	3	0	63	4	9	0
Official misconducts	0	0	0	0	14	4	0	0
Way to profit from tick-borne diseases	3	2	4	0	3	1	1	0

Results

Statistical Analysis

Based on the newspaper and article selection criteria, relevant articles were chosen and coded. All relevant articles were entered into and analyzed in SPSS version 22. Statistical analysis consisted of frequency distributions, independent samples t-tests, and Pearson's chi-square analyses.

Quantity of Coverage

To analyze informer and agenda setting effects, differences in the quantity of coverage between the US and China was examined. There was a significant difference in the quantity of coverage between the two nations, with China ($n = 569$) having significantly more articles than the US ($n = 368$); $t(925) = -48.45$, $p < .0001$. Chinese newspaper articles ($M = 1180.57$; $SD = 1008.71$) had significantly more words than US produced newspaper articles ($M = 925.97$; $SD = 688.75$); $t(925) = -4.24$, $p < .0001$.
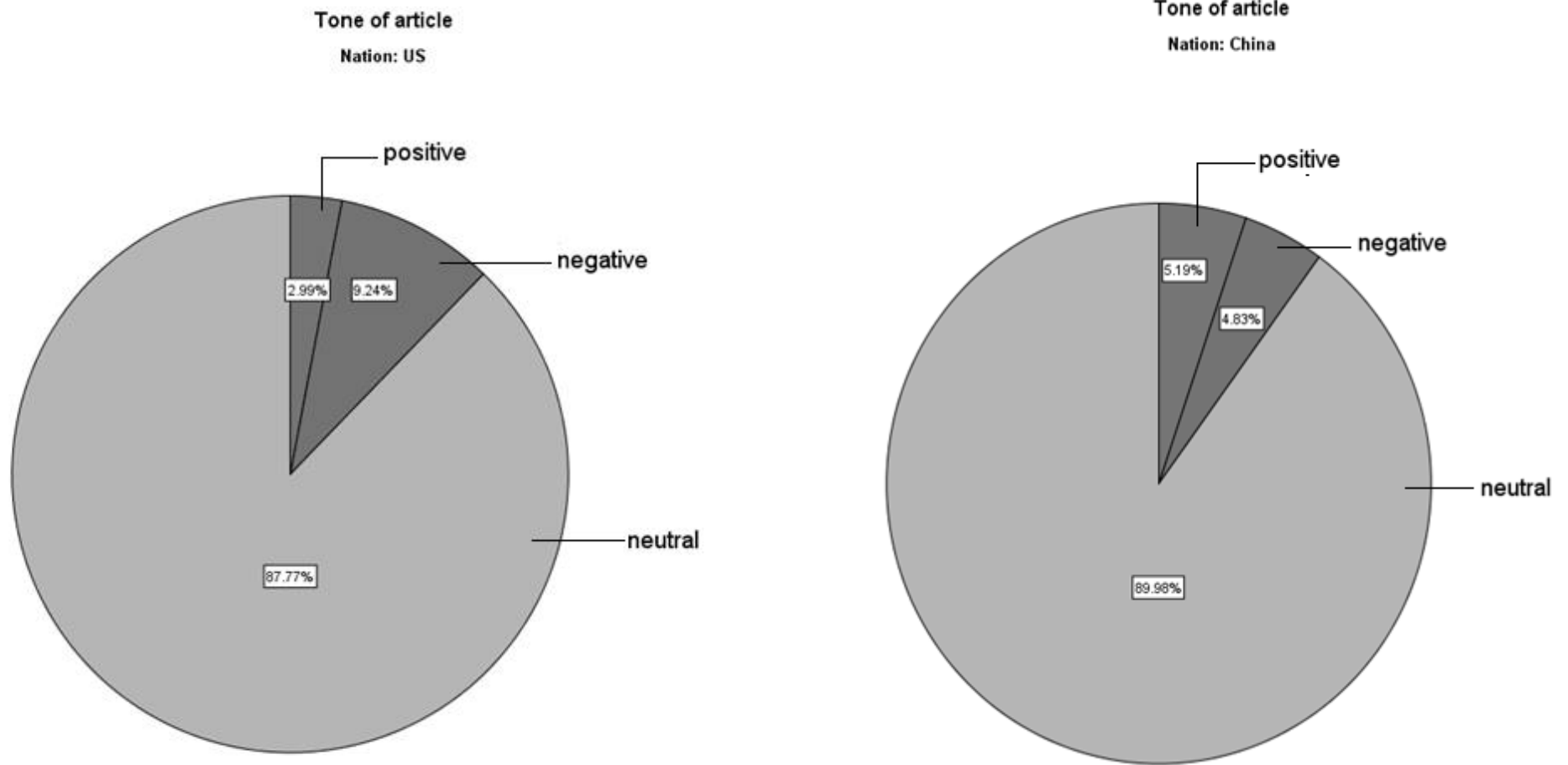
Article Tone

To assess framing effects, the tone of the coverage in the articles was explored. Articles were coded as having either: positive, negative, or a neutral tone regarding tick-borne diseases. In China, the tone was overwhelmingly neutral ($n = 503$), as opposed to positive ($n = 29$), or negative ($n = 27$); $\chi^2 (2) = 807.26$, $p < .0001$. In the US, the tone was also overwhelmingly neutral ($n = 323$), as opposed to positive ($n = 11$), or negative ($n = 34$); $\chi^2 (2) = 492.92$, $p < .0001$. There was a significant difference between the two nations on tone, and thus framing; China had a statistically higher percentage ($n = 29$, 5.2%) of articles take a positive tone, as opposed to US articles ($n = 11$, 3%); $\chi^2 (2) = 9.16$, $p < .01$.

Analyzing article tone distribution across the newspapers revealed vast differences. Differences in article tone between Chinese and US newspapers are visually represented in Figure 1. In China there was a significant difference in how tone was

distributed/discussed in the four newspapers, with the People's Daily being the only paper to significantly frame tick-borne diseases in a neutral ($n = 340$), negative ($n = 21$), and positive ($n = 27$) light; χ^2 (6) = 9.94, $p < .01$. In the US, there was not a significant difference in tone distribution.
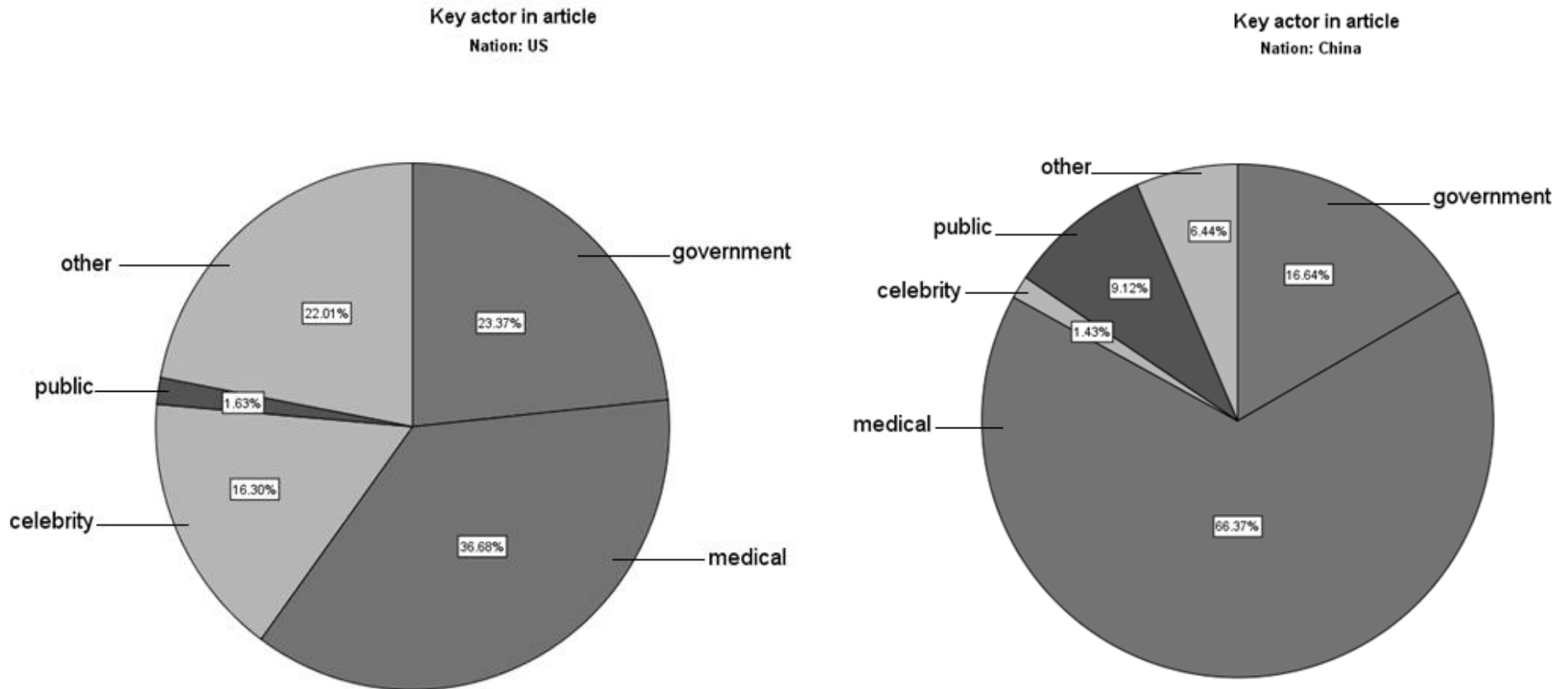
Figure 1. Tone of articles in the US and China

Tone of article
Nation: US

positive
negative
2.99% 9.24%
neutral
87.77%

Tone of article
Nation: China

positive
negative
5.19%
4.83%
neutral
89.98%

Article Themes

   Framing effects were also assessed through exploring the themes that emerged from the coded articles. Differences in emergent themes between Chinese and US newspapers are visually represented in Figure 2. In the US articles, 12 different themes emerged, which covered a broad spectrum of issues: passing mention of tick-borne disease ($n = 78$, 21.2%), animals (not pets) that carry Lyme ($n = 70$, 19%), celebrities with Lyme ($n = 56$, 15.2%), health and governmental policies about Lyme ($n = 45$, 12.2%), diagnosis ($n = 41$, 11.1%), what is Lyme and how to protect yourself ($n = 25$, 6.8%), notifications about disease spread ($n = 19$, 5.2%), pets and Lyme ($n = 9$, 2.4%), ways to profit from Lyme ($n = 9$, 2.4%), pesticides ($n = 8$, 2.2%), metaphors and similes about Lyme ($n = 5$, 1.4%), and climate and Lyme ($n = 3$, .8%). In the Chinese articles, 11 themes emerged, with one theme covering the overwhelming majority of the articles: what is Lyme and how to protect yourself ($n = 371$, 66.4%). The remaining 10 themes accounted for 33.6% of the articles, with one theme not emerging in the US articles but only in the Chinese newspapers, government/official misconduct ($n = 18$, 3.2%): pesticides ($n = 76$, 13.6%), notifications about disease spread ($n = 26$, 4.7%), pets and Lyme ($n = 24$, 4.3%) , passing mention of tick-borne disease ($n = 13$, 2.3%), animals (not pets) that carry Lyme ($n = 12$, 2.1%), celebrities with Lyme ($n = 7$, 1.3%), ways to profit from Lyme ($n = 5$, .9%), diagnosis ($n = 4$,.7%), and metaphors and similes about Lyme ($n = 3$, or .5%).

Figure 2. Key actors in articles in the US and China
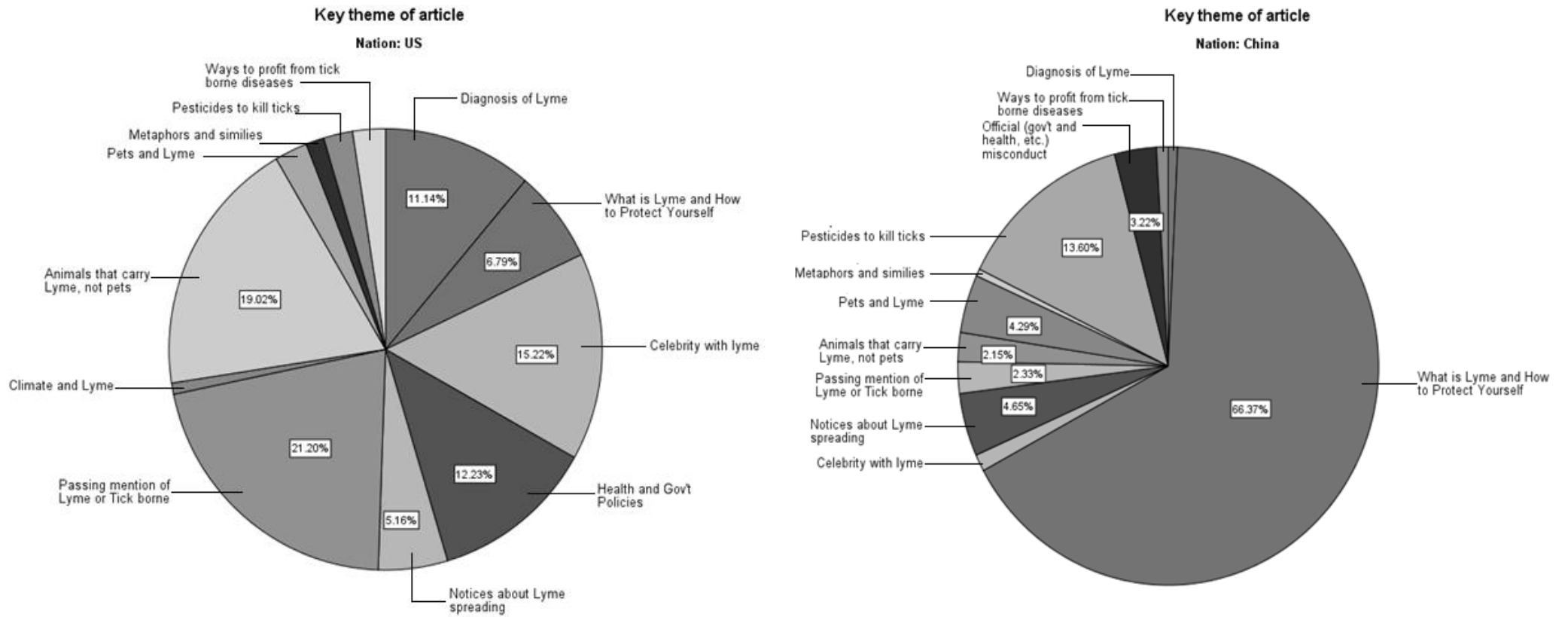

Key actor in article
Nation: US

government 23.37%
other 22.01%
public 1.63%
celebrity 16.30%
medical 36.68%

Key actor in article
Nation: China

government 16.64%
other 6.44%
public 9.12%
celebrity 1.43%
medical 66.37%

Key Actors

To address the key persuaders, or agenda setters, the key actors in the articles were examined. Differences in the key actors represented in Chinese and US newspapers are visually represented in Figure 3. In the Chinese newspaper articles there was a notable difference in the frequency of key actors represented, with one group dominating the coverage: medical/scientific ($n = 371$, 66.4%); χ^2 (6) = 784.93, $p < .0001$. While in the US newspaper articles there was a significant difference in the frequency of key actors represented, with three categories of actors representing statistically similar numbers: medical/scientific ($n = 135$, 36.7%), governmental officials ($n = 86$, 23.4%), and other, like insurance ($n = 81$, 22%); χ^2 (4) = 118.66, $p < .0001$. In comparing the US and Chinese newspapers, the key actors differed in three ways. First, medical/scientific actors ($n = 371$, 66.4%) were more prevalent in Chinese newspapers than in US newspapers ($n = 135$, 36.7%). Second public/private citizens ($n = 51$, 9.1%) were more prevalent in Chinese newspapers than in US newspapers ($n = 6$, 1.6%). Third, other, primarily insurance representatives were more prevalent in US newspapers ($n = 81$, 22%) than in Chinese newspapers ($n = 36$, 6.4%).

Figure 3. Key theme of the articles in the US and China

Key theme of article
Nation: US

Ways to profit from tick borne diseases
Pesticides to kill ticks
Metaphors and similies
Pets and Lyme
Diagnosis of Lyme
11.14%
What is Lyme and How to Protect Yourself
6.79%
Animals that carry Lyme, not pets
19.02%
Celebrity with lyme
15.22%
Climate and Lyme
21.20%
Passing mention of Lyme or Tick borne
12.23%
5.16%
Health and Gov't Policies
Notices about Lyme spreading

Key theme of article
Nation: China

Diagnosis of Lyme
Ways to profit from tick borne diseases
Official (gov't and health, etc.) misconduct
3.22%
Pesticides to kill ticks
13.60%
Metaphors and similies
Pets and Lyme
4.29%
Animals that carry Lyme, not pets
2.15%
Passing mention of Lyme or Tick borne
2.33%
4.65%
What is Lyme and How to Protect Yourself
66.37%
Notices about Lyme spreading
Celebrity with lyme

Discussion

One finding of this study is that tick-borne disease stories were overwhelmingly framed in a neutral way in both the US and China. This is hardly surprising as disseminating health information in a negative way might create fear, cause patients to lose hope, and discourage them from seeking further information (Brashers, Goldsmith, & Hsieh, 2002). Thus, reporting health issues with a neutral tone could be a universal phenomenon. Given that health news requires in depth understanding and knowledge of professional fields, ordinary journalists may find it hard to precisely report every detail of the health issue (Collins, Abelson, Pyman, & Lavis, 2006). The safest way could be report it as neutral as possible. In addition, national characteristics may also contribute to the usage of neutral frames in health reports. For example, the fact that China has experienced severe public panics caused by health crises may further discourage the use of negative tones in Chinese newspapers. During the Severe Acute Respiratory Syndrome (SARS) crisis in 2003, excessive media coverage on SARS stirred up public anxiety across China. It was rumored that a traditional herb called Ban lan gen is "the magic remedy" for SARS. Panic buying and hoarding of Ban lan gen were witnessed all over China, which also led to huge price inflation of the herb (Wan, 2013). Similar panic buying took place in China during the Fukushima accident in 2011. Chinese public was highly concerned about the possible radiation poisoning from the wrecked Japanese nuclear power plant. A large scale of panic shopping of salt in China was triggered by rumors claiming iodized salt could protect human from radiation poisoning (Anonymous, 2011). During these events, national and provincial agencies have taken steps to combat hoarding, spreading rumors, and inflating prices. Consequently, attempts to avoid causing the public to panic are a primary concern in health information dissemination in China. This also echoes to the China's general stability maintenance policy. Stability maintenance has been one core policy of Chinese Communist Party for the last two decades

(Chongyi, 2013). Activities, typically collective protests, which might threaten societal stability, are prevented. In terms of news dissemination, stability maintenance policy fosters suppression on news that may spark public anxiety. In the initial stage of 2003 SARS outbreak, two Guangzhou local newspapers "the *Nanfan Daily*" and "*the YangCheng Evening News*" did the first coverage of SARS and described it as "the mysterious illness". However, further report on SARS and panic buying was banned from these newspapers for stability maintenance reasons. In China disease and disaster news are seen as negative news (Abraham, 2007), therefore they shouldn't be further reported with negative tones. However, being exposed in the overly neutral and positive coverage of diseases, citizens may underestimate the seriousness of the situation and become more vulnerable to the diseases.

Another noteworthy finding of this study is newspapers in US featured more celebrity-related stories compared to newspapers in China. The transfer from media agenda to public agenda can be accelerated when well-known individuals get involved (Lang & Lang, 1983). Celebrities have an influential role in the promotion of public awareness and sensitivity toward a wide range of societal health issues such as the sale of pharmaceuticals, safe sex, avoiding illegal drugs, and disease campaigns (Nattinger, Hoffman, Howell-Pelz, & Goodwin, 1998; Wilkes, Bell, & Kravitz, 2000). A previous study showed a significant increase in the number of the utilizations as a result of Katie Couric's March 2000 TV series even though she does not have a disease that required a colonoscopy process (Cram et al., 2003). In the same way, Magic Johnson's disclosure of his HIV test effectively promoted the campaign for HIV test (Brown & Basil, 1995). Media cover the celebrities' news because they are socially influential and attractive and people are emotionally involved and identified with them, which means people want to imitate and be like them (Brown & Basil, 1995). Comparing to the situation in US, the influence of celebrities on media coverage of health issues in China is slightly different. In a study exploring the newspaper coverage of AIDS in

China, Yu (2006) claimed the involvement of political figures is more effective in promoting the AIDS coverage than entertainment celebrities. Pu Cunxin, a celebrity from the entertainment field, joined anti-HIV/AIDS campaigns in 2001 by acting as the goodwill ambassador. Yet, no significant increase in the coverage of HIV/AIDS was witnessed in 2001. On the other hand, the AIDS coverage tripled in 2004 compared to in 2002 after Chinese premier Wen Jiabao made a public speech of combatting HIV/AIDS (Yu, 2006). Thus, featuring celebrity in Lyme disease stories is more common in the US newspapers could be owing to the fact that involving celebrities from the entertainment field is more effective in the US than in China.

This study also indicated the tick-borne disease stories in the US as opposed to in China focused more on health policies. One possible explanation is health policies have been consistently one of the top public concerns as health care cost in the US is enormous. US healthcare expenditure was about 11% of GDP in 2011 and it is heading to 20% by 2020 (Berwick & Hackbarth, 2012) and 29% in 2040 (Fogel, 2009). However, the amount of the financial burden of healthcare expenditure is different among the various age groups, for example at 85 and older it is 6 times as high as it is in 50-54 (Fogel, 2009). In an international scale, US Americans pay one of the highest amounts of healthcare expenditure. In 1997, measured in purchasing power parities (PPPs), US Americans paid $4,090 per capita compared to Switzerland $2,547, South Korea $587, and neighboring Mexico $391 (Gerdtham & Jönsson, 2000), while Chinese paid only $87.1 in the same measurement, and this amount grew to $645.63 in 2013 (5.6% of GDP) comparing to $9146 (17.1% of GDP) for the US Americans, $9279 (11.5% of GDP) for Switzerland, 1880 (7.2% of GDP) for Korea, and 664.32 $ (6.2% of GDP) for Mexico (Countries, n.d.; Health expenditure, n.d.). The higher amount healthcare cost in the United State brings more into focus the health care policies as it put a higher financial burden on the American society than it does in China. In

Zhengquan's report about dispute between beneficiary and insurance company upon possible tick-borne disease caused death, he noted that after intensive media exposure of the disease, Chinese local government and health department took serious consideration of tick-borne diseases, and included treatment drugs into medical insurance coverage (2015). Few report on insurance issue of tick-borne diseases in China can also be explained as media did not value news till it involved high mortality rate or death (Adelman & Verbrugge, 2000; Zhengquan 2015).

Limitations and Directions for Future Research

One limitation in the current study is non-print media outlets such as television and internet were not included. Newspaper circulation is rather small in rural areas in China (Peng & Tang, 2010). In addition, new media are becoming a major source of health information. Thus, future research should also consider television and internet coverage of health stories. In Yu's study, news publishing date was closely looked and examined. Yu argued that during international and national holidays, negative news as HIV/AIDS has little exposure on media which might be caused by the fact that people would not like to have unfavorable news throughout pleasant months (2006). Therefore, besides tone of article, key actors and theme, scholars can explore the reason behind possible distinctive reports in different years.

The current study suggests entertainment celebrities in the US are more effective in promoting health stories. Various factors could impact an individual's response to celebrities. Studies have found a celebrity's influence is stronger among people with a lower income and educational status (Nattinger, et al., 1998), and those emotionally connected to a celebrity (Brown & Basil, 1995). Therefore, future studies are warranted to analyze individual and contextual factors to fully grasp the role celebrities play in health news.

Nonetheless employing a quantitative content analysis method, this study could be strengthened through also employing a qualitative approach. A qualitative approach would

permit an analysis of cases where different tones were generated from similar content and the dynamics when multiple key actors co-exist. Furthermore, the sampling in this study is a potential limitation. The US and China were selected for this study because both nations have experienced an increase in tick-borne diseases, and are diverse in terms of landscape and climate conditions. It is imperative to expand our understanding of public's perception of tick-borne diseases in other parts of the world where frequent tick-borne diseases incidences are also observed.

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