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How pseudo-scientific rumors in China's public health crisis spread online: A case study of Shuanghuanglian event in fighting COVID-19

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A R T I C L E I N F O

A B S T R A C T

With the burgeoning development of the internet and fast spreading of information through it, how to deal with pseudo-scientific rumors - in time is of great value for official administrations at all levels. Under the context of a global public health crisis: the outbreak of COVID-19 in China, a pseudo-scientific rumor concerning Shuanghuanglian oral liquid, a Chinese traditional medicine, has been widely spread on Chinese social media platforms. This study took this event as the case and selected 39 hot articles, all of which have been viewed over 10,000 times, to conduct a textual analysis by calculating the keyword weight and an emotion analysis. With the aid of the grounded theory, a rumor influencing model was constructed for the exploration of the online dissemination of the rumor and the corresponding public behaviors. Accordingly, some suggestions for the prevention and control of possible pseudo-scientific rumors in the future were proposed.

1. Introduction

Nowadays, penetrating into all aspects of social life, the Internet has been greatly changing the way we live and the way information is spread. Network communication integrates the characteristics of mass communication (one-way) and interpersonal communication (two-way), forming a kind of radial-like spreading pattern which any network nodes can initiate and post information and all the information spreads freely(Pang, 2015). Network is like a high-tech double-edged sword, which not only promotes the development and progress of human society, but also have many negative effects, one of which is the proliferation of superstition and pseudo-science. Because of the convenience and anonymity on the Internet, pseudo-scientific rumors which is in the guise of genuine science are more and more,. Social media has become indispensable in people's digital life. The convenience and efficiency makes social media a powerful channel for mass communication (Hermida, 2010). Social media, represented by WeChat official accounts in China, has become an important platform for Chinese people to get information. It has completely changed the time sequence of news production. And the easy access has created a more diverse discourse field (Zhu, 2015). According to the latest statistics done in 2019 by Tencent, a big Internet-based communication company in China, , the monthly number of active WeChat users exceeded 1.1 billion. The interactivity and immediate access enable pseudo-scientific rumors to spread in a fission-like way. The large volume and easy sharing of information enable pseudo-

scientific rumors to increase greatly, and both the individualization and socialization of new media allow the contents of pseudo-scientific rumors to be updated constantly for specific groups (Chen, 2016). Owing to the wide circulation, if the news on social media could not be verified in time, there is rumor possibility (Procter, Vis & Voss, 2013). In various studies, social media has been used for the study of public opinions and interpretations(Murphy, Link, Childs, Tesfaye, Dean, Stern, Pasek, Cohen, Callegaro & Hardwood, 2014).Social media has also proven to be an effective crisis management device and there have been various studies to further augment the use of social media for better crisis response and management (Reuter, Hughes & Kaufhold, 2018). In protests, emergencies and natural hazards, people have been using social media in a subtle way for information dissemination and as such its use in crisis management has been picking up momentum in recent years (Imran, Castillo, Diaz & Vieweg, 2015).

Recently, COVID-19 broke out in Wuhan, the capital city of Hubei Province, China. On December 31, 2019, Wuhan Municipal Health and Health Commission reported that 27 patients who had some connection with South China Seafood Market of Wuhan were found suffering from unexplained pneumonia, 7 of them serious and 2 close to be cured. On January 20, 2020, 198 patients were confirmed in Hubei Province, and other provinces and cities in China also had confirmed cases. Chinese academician Zhong Nanshan, director of China Respiratory Disease Clinical Medical Research Center, declared that the virus could be transmitted from

person to person. By 18:15 on February 12, the confirmed cases had reached to be 44,763, the suspected cases to be 16,067, the cured ones to be,4963 and 1,114 died in China. The epidemic has involved more than 25 countries including Japan, Singapore, Thailand, South Korea, Malaysia, Germany, Australia, Vietnam, the United States and France with 442 confirmed cases there. As public's attention turned to the epidemic, various rumors were propagated on the Internet. Some WeChat official accounts posted that COVID-19 could be inhibited by a kind of Chinese traditional medicine: Shuanghuanglian oral liquid. After that, pseudo-scientific rumors spread among Chinese people. Shuanghuanglian oral liquid was sold out overnight both on the on-line shops and in drugstores. Under the context of new public health crisis in China, taking the pseudo-scientific rumor of Shuanghuanglian spreading on Chinese mainstream news media, WeChat official accounts as the case, this study explored the dissemination mechanism of pseudo-scientific rumors and the corresponding public behaviors with an aim to offer some suggestions for governments at all levels to avoid the generating and spreading of the possible pseudo-scientific rumorsin the future.

2.Literature review

Pseudo-scientific rumor is a kind of unconfirmed but widely spread information .Being supported by science and technological theories and produced in the context of scientific events, pseudo-scientific rumors are usually under the guise of science (Reshi & Ali, 2019). They have wide coverage, covering mainly about five major fields, namely: medicine, food, biology, physics and chemistry. Allport and Postman (1947) proposed a spreading formula of rumor : rumor = importance × ambiguity. That is to say, the scope that a rumor spreads is the co-effect of the importance of the event and the fuzziness of the information. If either of the two is zero, the rumor will terminate. Chorus (1953) revised the formula. He believed that people's critical ability was negatively related to rumor circulation. Critical ability includes personal knowledge reservation, observation ability and moral quality. Rosnow (1991) pointed out that the spread of rumor was related to four factors: personal anxiety, credulity, general uncertainty and outcome related involvement of the event result. There are similarities between these variables, for example, uncertainty could be considered as fuzziness, while credulity can indicate the degree of critical ability..

Traditionally, rumors were spread by word of mouth, which meant that the deliminators and the receivers must be in the same time and same space. However, the development of the Internet has broken the limit, and rumors could be duplicated and delivered on a large scale in minutes. With anonymity guaranteed by the Internet, there is no need to consider the identity in rumor dissemination. So on various news media platforms, rumors are produced and spread quickly. In this process, an element could not be ignored, that is, to what extent the individual considers the rumors are credible. Generally speaking, people tend to spread what they believe. How do people judge the reliability of information based on the existing clues? The probabilistic mental model provides a possible analysis framework: to judge the credibility of rumors according to four aspects: 1) whether the source of the rumor is reliable; 2) whether the content of the rumor is reliable; 3) whether the rumor meets the psychological expectation; 4) in what situation the rumor is received.

In recent years, environmental and health problems threaten the world across regions and time, forcing us to "live on the volcano of civilization"(who said it and when?). When modernity, which is built on science and technology and rationality, is being repeatedly questioned and criticized, and when the information about science and technology cannot be obtained through formal channels or

there is a lack of information, rumors will gradually occupy the highland of information dissemination, meeting people's need for information and comforting people's anxiety and uneasiness. Because of its convenience and universality, social media has become a powerful channel for mass information delivering, which can not only deliver authentic news reports, but powerfully spread rumors (Reshi & Ali, 2019). Sahana, Pias, Shastri and Mandloi (2015) conducted a machine learning study on London riots Twitter News and its transferring. And their findings showed that content characteristics are parameters for rumor detection and most active users tended to promote rumors but failed to build and maintain Twitter's credibility. Kwon, Cha and Jung (2017) took random forest algorithm as their research method and selected features oftime, language, user and network, with the time windows of 3, 7, 14, 28 and 56 days respectively. The authors proposed two algorithms, one having user and language features, the other having all the features. It was found that user feature and language feature have better effects on rumor detection, while structure features and time features are conducive to the separation of rumors from truth. Takahashi and Igata (2012) discussed the characteristics of rumor re-tweet ratio, and found that although there was no definite conclusion based on the surveyed samples, it may be beneficial to large-size samples. Jain, Sharma and Kaushal (2016) found that verified news channels on Twitter are less likely to spread rumors than any other users. Chen, Li, Yin and Zhang (2018) used recurrent neural networks to study rumors. In their research model, attention mechanism was used to figure out the key words for specific rumor category. In the experiment, a batch of posts were created at artificially defined time intervals by using TFIDF. The conclusion has been reached that attention mechanism is effective in rumor detection. Reviewing all the existing research, scholars have made various trials in the field of rumor detection and mitigation. Many scholars used simple cue-based, web-based, psychological and social theory-based methods, while others employed machine learning methods. There is little research on the dissemination of pseudo-scientific rumors through the Internet, especially on their impact on public behaviors and the problems revealed in the public health crisis events, which are worth our in-depth study.

3.Research method

Against the context of the blowing out of network public opinion, how to deal with network rumors in time has attracted the attention from governments at all levels. In studies, newsworthy rumor events are usually taken as the research cases. This study is composed of two parts: the first part is of a detailed description of the occurrence and development of the pseudo-scientific rumors on the internet and the second part is the analysis of the internal properties and public behavior triggered. There is more than one case of pseudo-scientific rumors about the COVID-19 in China, but the case of Shuanghuanglian oral liquid has spread frighteningly rapidly and triggered instant public decisions and the government's quick responses, so this event was selected for the study A short article on Shuanghuanglian oral liquid, a Chinese herbal medicine, was released on the evening of January 31, 2020 on the official micro-blog "Xinhua Viewpoint" of China's Xinhua News Agency. It said that the broad-spectrum antiviral drug, Shuanghuanglian oral liquid had restraining effects on the COVID-19. Soon, the article was reprinted by many media including the official micro-blog of People's Daily. At that moment, the epidemic was rampant, so the information spread swiftly on the Internet. As a consequence, Shuanghuanglian oral liquid was sold out in the drugstores and on all the e-commerce platforms over night, and even the raw Chinese medicine ingredients concerned such as honeysuckle, Scutellaria and forsythia as well as Banlangen were all sold out-instantly. On

February 1st, a press spokesman of Shanghai Institute of Medicine, Chinese Academy of Sciences, declared that could only be inhibited by Shuanghuanglian in vitro experiments, and it was necessary to confirm its effects through further clinical experiments. On the same day, the official micro-blog of People's Daily reported that the discovery was still the result of a preliminary study. Research on the medicine has been being carried out in Shanghai Public Health Clinical Center and Tongji Hospital Affiliated to Huazhong Science and Technology University. A large number of clinical experiments must be done for the determination of whether it is effective clinically. Without doctor's advice, it is not recommended to take Shuanghuanglian liquid. The restraining effects in vitro experiment are not equivalent to those in clinical prevention and treatment.

Chinese government denied the rumor only two days after its release, but the impact could not be ignored. The panic purchase caused the price of several kinds of Chinese medicine in stock to soar, which certainly had a negative impact on the market order. And the long overnight queues may have caused new cross infections of the virus. Activities in rumor spreading and the refutations could easily make people doubt the official media and the reliability of scientific research institutions, which may harm officials' power and influence the public's trust. In addition, a new round of rumors induced by this event emerged too, bringing further difficulties in epidemic prevention and control.

When a study has no complete biological evidence to support the effectiveness of its theory in all environments, it should not be exposed to the public through social media, which may cause the public's collective behavior, or produce adverse effects on social order and public opinions (Callaghan, 2019). Based on such incidents, this study aimed to investigate the dissemination characteristics of this typical rumor event. As a new media platform, WeChat official account is powerful in communication, coverage and influence on the public opinion. It is one of the most popular media tools at present in China, which is characterized by large user number for its immediacy, convenience, etc (Xiang & Shen, 2019). Considering the effective communication ability of WeChat official accounts and the active interaction of the message comment area, this study searched the articles on the WeChat platform with "Shuanghuanglian" as the key word. The hot articles (read over 10,000 times) and comments from January 31 to February 4, 2020 (from pseudo-scientific rumor explosion to official denying rumor and public awakening) were selected. Three issues were analyzed and clarified, which are as follows:

1. What is the focus of WeChat hot articles about Shuanghuanglian?

2. What are the public's concerns and attitudes in their comments on Shuanghuanglian event?

3. In the context of these rumors, how did the public behavior change accordingly?

This research selected 39 hot articles posted on WeChat platforms from January 31 to February 4, 2020, including 230,929 bytes of articles and 96,121 bytes of comments and NLPIR Language Natural to Information Retrieval (NLPIR) toolkit was used, which was developed by Beijing Institute of Technology for the analysis of the texts. There were three rounds of data analysis: in the first round, the characteristics of the public reports such as the weight of the keywords were analyzed to identify the information transmission characteristics on the official WeChat accounts; in the the second round, the weight of the key words and the public comments on the report texts were analyzed to make clear the public's emotional responses to pseudo-scientific rumors and the communication paths; in the third round, the public's attitude and behavior pattern in the spreading process of pseudo-scientific rumors were analyzed to further figure out the spreading mechanism of Shuanghuanglian rumor and its adverse effects on the public, with an aim of preventing and intervening other similar pseudo-scientific rumor events.

4.Features of online texts

The key words in 39 hot articles were identified and statistically analyzed. Based on the features of word frequency, word length, part of speech, location and Internet high frequency words, the importance of the texts was automatically weighted by computer, and the feature weight of the key words was also calculated. The selected feature words have been listed in descending order. After the worthless words such as "can" and "may" were removed, the weight ranking of the top 20 keywords are shown in Table 1. Shuanghuanglian, the subject of the rumor, ranked the first. It is a kind of traditional Chinese medicine, which is composed of honeysuckle, Scutellaria and forsythia, and has the effect of dispelling wind, relieving syndromes, clearing away heat and detoxifying. It is commonly used in the treatment of patients who suffer from the cold caused by exogenous heat, in which fever, cough and sore throat are common symptoms. It is a broad-spectrum antiviral drug. The words traditional Chinese medicine and its treatment occupied the eighth and ninth place respectively in the ranking. Since the outbreak of COVID-19, the research on public opinions and official treatment plans has always been concerned about various Chinese herbal medicines and Chinese traditional medicines. The new diagnostic plan for the treatment of COVID-19, which is jointly issued by the National Health Protection Commission and the State Administration of Traditional Chinese Medicine, has been introduced to the public from the first to the fifth edition (as on February 5th). Most of COVID-19 prescriptions are derived from the ancient prescriptions used to treat epidemics in China, indicating that these Chinese medicines have the potential to prevent and control the epidemic.

Table 1. Top 20 keywords for researched texts based on weight ranking

	KEY WORDS	WORD CLASS	WORD WEIGHT	WORD FREQUENCY		KEY WORDS	WORD CLASS	WORD WEIGHT	WORD FREQUENCY
1	Shuanghuanglian	n.	139.29	616	11	Wuhan	n.	32.81	51
2	research	v./n.	54.68	208	12	inhibit	v.	32.48	149
3	virus	n.	49.45	156	13	Shuhongbing	n.	31.04	16
4	medicine	n.	46.20	135	14	prevent	v.	30.16	74
5	treatment	n.	43.01	104	15	clinical	adj.	29.63	65

6	novel coronavirus	n.	37.80	130	16	begin/start	v.	28.46	38
7	epidemic situation	n.	37.30	82	17	professor	n.	28.35	40
8	Chinese medicine	n.	36.40	92	18	media	n.	28.32	47
9	traditional Chinese medicine	n.	33.37	73	19	clinical experiment	n.	27.33	62
10	report	v./n.	33.31	62	20	mask	n.	27.05	46

The words research, clinical and clinical experiment ranked the second, fifteenth, nineteenth. It showed that the research on drug treatment was more concerned about the rumor spreading process. It has been proved that Shuanghuanglian could inhibit coronavirus in vitro tests, but the development process of such medicine usually involves in vitro, animal and clinical trials. Only in this way could the pharmacological effects of the medicine could be determined. Some articles also proved the authenticity of this event, and explained the importance of scientific spirit and rational judgment. The words viruses, novel coronavirus and epidemic situations came in the third, sixth and seventh place, respectively, indicating that the current epidemic situation is increasingly serious, and any news related to the epidemic will naturally attract close attention. The word inhibit was in the twelfth place. According to the Chinese Medicine Research Institute, the above-mentioned Chinese medicine could inhibit the novel coronavirus in vitro, and it was not to mislead the public into thinking that it is effective in preventing and treating the epidemic. However, this statement was easily misunderstood. On the following day, the official micro-blog of People's Daily issued a message, trying to stop the spreading of this pseudo-scientific rumor , pointing out that inhibition is not equivalent to prevention and treatment, and reminding the public not to rush to buy and take Shuanghuanglian oral liquid without the doctor's advice. A person whose name ranked the thirteenth on the list, is a top scientist working in the research centre that posted the news. The high weight of the scientist's name indicates that the pseudo-scientific rumor caused a new round of false information dissemination, which further weakens the public trust in scientists. The reason why pseudo-scientific rumors could have immense impact is not only because of its own adverse influence, but also because of its re-dissemination by the readers, which can magnify the influence several times and shake the foundation of public trust (Lai, 2014).

5.Results of comments on WeChat hot articles

Our study applied the weight analysis function of NLPIR big data semantic intelligent analysis system to analyze the comments of the 39 hot WeChat articles, which could comprehensively reflect the spreading characteristics of the rumors about Shuanghuanglian. The ranking of the top 30 keywords implies that the public are very concerned about the prevention, treatment and drug research of the epidemic (Table 2). Shuanghuanglian and Jieeryin ranked the first and twelfth on the key word list respectively. Jieeryin is a kind of traditional Chinese medicine lotion for clearing away heat, drying dampness, killing germs and relieving itching for women. During the SARS period in 2003, a drug institute declared that Jieeryin lotion had the effects of preventing SARS virus. In addition, Huoxiang Zhengqi liquid, Banlangen and other traditional Chinese medicine had also been involved in similar public opinion events, which means similar stories happen again in homologous conditions. This shows that the rumor event has a profound impact on the public, and it is easy to cause adverse effects in epidemic rampant stage. Therefore, the social impact must be taken into consideration when related organizations determine to release the epidemic related professional information. The key words concerning people's life are the emergencypurchase of masks,disinfectants,and Shuanghuang - lian oral liquid, which reflects the adverse impact of such rumors on the market order. Traditional Chinese medicine, Chinese medicine and Jiebiao (relieving exterior syndromes) ranked the second, thirteenth and fifteenth of the list respectively. Jiebiao is a unique term for traditional Chinese medicine, which refers to the effects of relaxing muscle surface, promoting sweating and relieving syndromes. It shows that this rumor event could trigger public debates in the field of traditional Chinese medicine. In 2015, Tu Youyou, a Chinese scientist, was inspired by traditional Chinese medicine and extracted a colorless crystal (Artemisinin) with molecular formula of $C15H22O5$ from plant Artemisia apiacea as a new antimalarial drug, for which she won the Nobel Prize. This kind of event also contributed to the public's attention to traditional Chinese medicine and Chinese medicine in this rumor event.

Table 2. Top 20 keywords for comment texts based on weight ranking

	KEY WORDS	WORD Class	WORD WEIGHT	WORD FREQUENCY		KEY WORDS	WORD CLASS	WORDWEIGHT	WORD FREQUENCY
1	Shuanghuanglian	n.	64.49	135	11	media	n.	20.91	34
2	Chinese medicine	n.	36.65	65	12	Jieeryin	n.	20.28	5
3	virus	n.	36.32	74	13	traditional Chinese medicine	n.	19.63	24
4	restrain	v.	32.36	81	14	panic buying	n.	19.58	24

5	research	v./n.	26.78	31	15	relieving exterior syndromes	n.	19.10	9
6	mask	n.	24.92	34	16	medicine	n.	18.86	20
7	epidemic situation	n.	24.30	29	17	rumor	n.	17.94	19
8	question	n./v.	21.98	33	18	oral liquid	n.	17.70	45
9	prevent	v.	21.97	35	19	report	v./n.	17.68	27
10	treatment	n.	21.37	29	20	pharmacy	n.	17.12	22

The public attitudes and behavior characteristics were gained through the emotion analysis of the public' comment texts on the 39 hot articles. The emotional score of the comment texts is 146, which means that most of the public still maintain their support and hope for the country government, media and research institutions. Based on the scores, there were changes in their opinions in the event: on the first two days of the release, they trusted and were excited; two days later, the score was negative, showing that they changed their attitude. The government and the media quickly denied the rumor. The behavior of panic purchase also had an adverse impact on the social order. Some media spread other new rumors. All these led to public's distrust in traditional Chinese medicine and traditional Chinese medical treatment, and the public were angry at:1) the research institute's inaccurate statements; 2) the social unrest triggered by panic purchase; 3) the government's improper and delayed measures to deal with the crisis. Some public, in the comment area, called on the public to face the network information rationally and not to blindly follow the rumors.

6.Collective behavior triggered by pseudo-scientific rumors

The grounded theory, which was put forward by Glaser and Strauss, consists of a set of systematic methods and principles for data collection and analysis. It emphasizes the generation of new concepts from the original data, which involves logging the data by steps, making continual comparisons between data and concepts, systematically inquiring and generating theoretical issues, establishing relationships between concepts and the codings, and accordingly a theory is produced (Chen, 2015). Rumor eventswill eventually turn toa kind of collective behavior, which is a spontaneous unstructured thinking, feeling and action of many people. The beginning form might be fanaticism, panic, popularity, mob, riot, etc., and the organized collective behaviors, such as reform and revolution, tend to occur under the influence of rumor. Chen and Wang (2012) used the grounded theory to analyze the data of a case, and constructed an influencing factor model of collective behavior triggered by rumors . In this study, based on a three-level coding pattern of the grounded theory, the development model of collective behavior triggered by rumors —— panic purchase of Shuanghuanglian was constructed (Figure 1)
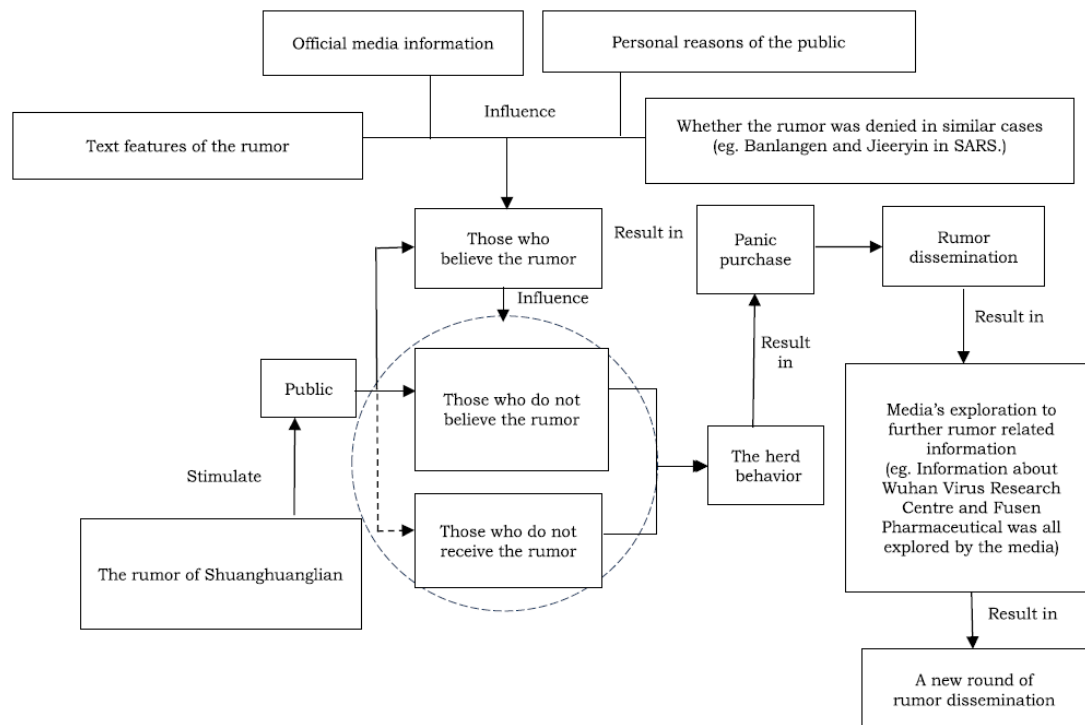

Figure.1. Development Model of Shuanghuanglian Rumors Initiating Rushing Behavio

Based on the model, the public's attitudes towards the rumor of Shuanghuanglian were classified into three types: believing, not believing and not receiving the rumor, and the influencing factors of their participation were then analyzed. The most important element for a rumor to trigger the collective behavior is whether the rumor could affect the attitudes of its receivers. The research holds that the public's response to a rumor is mainly influenced by the characteristics of the rumor , official media information, other similar rumor events and the public's own factors. Those who believe the rumor will have the collective behavior will become new dissemination of the rumor. Those who do not believe will take others' behavior as their information source, which may cause herd behavior too; and whose who do not receive the rumor will observe the group's common behavior, and in order to maintain to be correct, they may also follow their peers. Thus the chain effects are quite apparent. This Shuanghuanglian rumor, under the influence of certain elements, not only caused the public to believe it but also led to panic buying, which eventually caused those who did not believe or knew the rumor to participate in the buying, too. Such chain effects could easily expand the influence scale of rumors and multiply their harm, even if the rumor could be soon corrected.

Many media analyzed the incident from scientific perspectives in order to reduce the adverse effects, but some media further explored the possible sources of the information and spread out a new round of rumor, claiming that "human flesh search" should be carried out on Shanghai Institute of Medicine and Wuhan Institute of Viruses, which proposed the information of Shuanghuanglian, and the heads of the two institutions, even their relatives also needed to be searched (Figure 1). And others claimed that an in-depth search on the pharmaceutical companies whose share stock price had skyrocketed in the incident was also necessary. Under current collective anxiety over a serious infectious disease, all these articles and ideas may do further harms to the public health order.

7.Discussion

This paper adopted the text analysis method to analyze 39 hot articles and their public comments. With the grounded theory, an influencing factor model of collective behavior caused by pseudo-scientific rumors was constructed. According to the results, it could be concluded that: 1) effective early warning system, network supervision and strict network information review mechanisms are all in need; 2) standardized laws and regulations to supervise rumors and their spreading, strengthened punishment,and a complete legal responsibility system are also necessary. From the official point of view, supervision can be carried out in both production and dissemination of the false information. Increases in the costs of false information occurrence and dissemination can rein the source of network rumors. The authoritative media can guide network information and the netizen, so the denying of the rumor is an effective measure to eliminate the uncertainty of information. However, hasty deny of rumors can't satisfy the desire of netizen for the truth. Therefore, when refuting rumors, the government should be objective, fair and targeted, and the truth must be restored as much as possible. As for WeChat platforms, some suggestions should be taken into consideration: they must take responsibility for the information contents, establish a muti-channel information collecting mechanism, understand the public opinion trend through the active supervision of hot discussed keywords and articles,, inhibit the spreading of false information timely, use necessary technical support to track online rumors; at the same time, they should establish a feedback mechanism for the Internet users. The spreading of rumors, false information and unverified contents will eventually be curbed by a new generation with well-educated

background (Scheufele & Krause, 2019). Therefore, we can use the methods of user reporting and proof to gather the power of microblog users and netizen to identify the authenticity of information. As for the netizen, there is no infallible criterion to identify the rumors on the Internet. Netizen mainly rely on their educational experience, life experience and critical thinking abilities to judge the authenticity of information (Zaboski & Therriault, 2019). The irrational behaviors of netizen in the spreading of the rumors on the Internet are mainly affected by personal judgment and group attitudes, and blind obedience to group attitude may result in wrong judgement. When faced with uncertain information, netizen should regulate their own behavior, believe in science, verify the news rationally, and respond reasonably. Finally, the system of refuting rumors and the work of dealing with the aftermath should be improved. Once rumor is generated, it should be refuted quickly and authoritatively. After the rumor vanishes, the social instability caused by the event should be paid attention to.

8.Conclusion

In an era with the highly-developed Internet, the influence of network rumors on the public can not be ignored. The formation and development of all kinds of rumors have a process, namely: before the birth of rumor→ the birth of rumor→ after rumor's birth. Therefore, supervisions and regulations on network pseudo-scientific rumors should be applied in all these three stages to prevent the spreading of vicious rumors. Information diversification, three-dimensional expressions, and interactivity in communication are the advantages of network communication. It also has some shortcomings. Different from other communicative approaches, network communication has the feature of concealment. The dissemination are in a concealing position. On the Internet, it is impossible to find the dissemination of negative and malicious information only by personal means. This feature just creates a good condition for the spreading of pseudo-scientific rumors. This paper analyzed some hot articles and comments on the WeChat platforms. To a large extent, the research results described the spreading characteristics of the online reports and comments on the rumor of Shuanghuanglian event. Employing the grounded theory, this paper analyzed the development process of rumor spreading, the collective behavior triggered, the potential influencing factors, and put forward some feasible suggestions. But the sample size is small, so in the future research, it is recommended to further expand the sample of the texts. And the analysis should be combined with other similar events to further explore the characteristics of network rumor dissemination. In doing so, we can provide some practical suggestions for governments at all levels and for the network platforms.

The uncertainty of science and the lack of public trust in scientists also contribute to the generation of pseudo-scientific rumors. On the one hand, there is uncertainty in science development. The way of scientific progress is tortuous and spiral. One of the essential characteristics of science is fallibility. Science itself has the problems of value loading objectives, fallibility of reasoning process and over generalization of applications. On the other hand, there is sort of collapse in the public trust in scientists. With the great stride from traditional small science to an era of big science, the paradigm of knowledge production and distribution within the scientific community is changing, and the overall living environment of scientists is changing; outside the scientific community, the relationship between scientists and the public is also changing. After scientists became a profession, the driving force of their research has changed away from curiosity and interest, and is more related to academic papers, funded projects and administrative positions. This makes the scientific research team

face cruel competitions. Thus there have been more scientific deviant and anomie behaviors, which shaken public's trust basis.

generation, dissemination and elimination of pseudo-scientific rumors is to improve the scientific literacy of the whole country (Li, 2019). The "brilliance" of pseudo-scientific rumors lies in its cover

In addition to the above strategies, the most important thing for the

of "science" . Therefore, to improve the scientific literacy of the public is the key to avoiding pseudo-scientific rumors. If we want to suppress and eliminate pseudo-scientific rumors, we must stop them with teaching, specialization and intelligence.

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