

The Generation Logic and Guiding Strategies of Medical-Related Online Public Opinion from the Perspective of Social Combustion Theory: An Analysis Based on fsQCA

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Abstract: Medical-related online public opinion is one of the most sensitive and easily provoked types of public opinion about people's lives and livelihoods, and its high-intensity generation mechanism has not been well understood yet. The exact reasons for all the people's anxiety are not yet known, so the management of public opinion risk is not very precise. Based on the Social Combustion Theory, this paper will select 28 representative cases of medical-related online public opinion in 2025 and use the fuzzy-set qualitative comparative analysis method to investigate the necessary conditions and multiple paths for the high-intensity generation of such public opinion according to the three dimensions of combustible materials, combustion accelerants and ignition temperature. Research has shown that the only necessary condition for strong generation of medical-related online public opinion is the intensity of media intervention. There are also four main modes of generation: the contradiction accumulation-dominant path, the all-factor superposition path, the institutional criticism-dominant path, and the special subject path. Therefore, different guidance will be provided for the medical public opinion mentioned above.

Keywords: medical-related online public opinion, Social Combustion Theory, fuzzy-set qualitative comparative analysis method

1. Introduction

Recently, many medical-related online public opinion events have drawn the attention of the public. As shown in the case of Dr. Shao Xiaobei in Zhoukou who was bullied online and the case of a patient injuring a doctor at the First Affiliated Hospital of Nanchang University are typical cases of such public opinion, and they generally have the characteristics of rapid generation, high emotional intensity and wide influence. Such public opinion will harm the hospital's reputation and damage the relationship among doctors, patients and society. Therefore, we can learn about the generation logic of public opinion and improve the governance of the country.

Generally speaking, medical-related online public opinion refers to all the emotions, intentions, attitudes and opinions that the public has generated because of medical incidents and spread on the Internet^[1]. As a particular type of online public opinion, the study of such public opinion should be based on the fundamental theories of public opinion science, and only after obtaining an accurate understanding of the concept, attributes and evolutionary laws of public opinion can detailed analysis be conducted^[2].

Many results have been obtained from the previous studies on the development path, driving forces and coping mechanisms of medical-related online public opinion. Zhang Min and others have presented the process of opinion differentiation for online public opinion on serious doctor-patient disputes^[3]; Du Hongtao and others have summarized the development pattern of online public opinion on emergencies^[4]; Lan Yuexin and Zeng Runxi have systematically analyzed the dissemination pattern and early warning stage of online public opinion on emergencies^[5]; Ye Qiongyuan and others have studied the risk evolution mechanism of medical-related public opinion^[6]. Lu Jiayue and others have built a theoretical foundation for the online public opinion risk response of public hospitals based on the concept of organisational resilience^[7], and Wang Juan and Liu Huiyan have found that the 4R crisis management theory is very effective in regulating medical-related public opinion^[8]. However, there are

still some deficiencies in the current studies: At the theoretical level, there is no systematic integration framework; At the level of methodology, most studies are limited to single-case analysis or single-variable analysis and thus fail to reveal the complex causal mechanisms of multiple concurrent factors; And at the practical level, the applicability of foreign research results in China has not been tested. Based on the shortcomings mentioned above, the Social Combustion Theory will be used as the analytical tool, and the fsQCA method will be employed to conduct a configurational analysis of the 28 typical cases. This paper will examine the necessary conditions for the strong generation of medical-related online public opinion, various ways in which it is generated, and different guidance strategies.

2. Literature Review and Theoretical Foundation

2.1 Research Results

The main contents of foreign medical public opinion include the spread of public health event information, communication during medical crises, health communication on social media, and the governance of misinformation. Most of the studies are in the form of both quantitative analysis and empirical research, and rich theoretical and practical experience has been accumulated in the field of crisis communication and misinformation governance.

Research on medical-related online public opinion in China started relatively late, and the first achievements were mainly in the characteristics and regulation of public opinion. Chen Lifu was the first to study the spread characteristics of medical-related online public opinion systematically^[9], and Lu Feijie has discussed the monitoring and management strategies of medical-related public opinion from the perspective of public opinion control^[10]. With the progress of research, more and more people have begun to pay attention to changes in public opinion and the reasons for such changes. Li Xiaolian and others have built a theoretical system for the generation mechanism of public opinion heat based on fsQCA analysis of 48 cases^[11], and Lü Chao and others have studied the feasibility of responding to medical-related online public opinion during public health emergencies^[12]. Ge Shenhua and others have carried out some application research and used the "Yu Xinhui" case and the "Wei Zexi" case as representative examples to study coping strategies in different situations^[13].

Some results have been obtained in the above research, but many problems still exist. Most of the research at home has focused on discussing particular public opinion events and has put forward a single coping strategy. They do not have a system of theories, fail to integrate and apply all the various theories properly, and have not established a single criterion for defining concepts. Although the foreign studies are relatively organised, it has not been determined whether the results can be applied to the domestic situation. There are no particular studies on the governance of misinformation and the leading of public emotion, so the governance needs in complex public opinion situations have not been addressed.

2.2 Social Combustion Theory and Its Application

Niu Wenyan proposed the Social Combustion Theory in 2001. The three parts that will lead to a bad outcome are the basic situation, the catalyst and the condition of instability^[14]. Many contradictions in real society are the origins of the accumulation of combustible materials. Accelerants of social combustion are social emotions, the public mood and media dissemination. The Social Ignition Temperature is the start of all sorts of motivation.

Zhang Jiahui, Chen Qiang and other scholars have applied the Social Combustion Theory to the study of online group incidents. They believe that the occurrence of such incidents is the result of the joint action of social combustible materials, online combustion accelerants and social ignition temperature^[15], but their research has not focused on medical-related public opinion. Based on the above theory and considering the special attributes of medical-related online public opinion, this paper puts forward an analysis framework of seven conditional variables to investigate the generation logic of medical-related online public opinion. The amount of combustible material is the range for the accumulation of doctor-patient conflicts (C1), and the sensitivity of the medical system is the sensitivity (C2); these are micro-level doctor-patient relationships and macro-level institutional contradictions, respectively. The three dimensions of the dimensions of combustion accelerants are the intensity of online emotional arousal (C3), information uncertainty (C4) and the strength of media intervention (C5); these correspond to the three main accelerating factors of emotion, information and

media. The two dimensions of ignition temperature are the severity of the event (C7) and the particularity of the person involved (C6), so there are two types of ignition: event-based and person-based. The seven variables are very suitable for the 28 cases and meet the variable quantity requirement of fsQCA; therefore, there will be neither a sparse truth table nor the omission of important factors.

2.3 Research Method: Fuzzy-Set Qualitative Comparative Analysis (fsca)

In 1987, Ragin first put forward the method of qualitative comparative analysis to solve the problem of multiple simultaneous causes in social science research^[16]. QCA is not a type of regression method; instead, it believes that the occurrence of an outcome is usually due to the joint effect of many different combinations of conditions. Fuzzy-set qualitative comparative analysis (fsQCA) can be used to have continuous values between 0 and 1 for conditional variables, and it is more suitable for dealing with the problem of "differences in degree" in the real world^[17]. The reasons for using the fsQCA method in this study are as follows: The generation of medical-related online public opinion is influenced by many factors, configurational analysis can reveal different paths, most of the conditional variables are in the form of ordinal or continuous data, fuzzy sets can better handle differences in degree, and fsQCA supports asymmetric analysis.

3. Research Design

3.1 Case Selection

By 2025, this paper will have gathered 28 cases of medical-related online public opinion. The sources are the Public Opinion Channel of People's Daily Online, the Zhiwei Shijian platform and other major media. Types of cases include death by medical accident, doctor-patient disputes, public health emergencies, academic misconduct, problems with medical insurance policies, etc. The selection criteria are as follows: The events have gained some attention across the country, relevant information is relatively abundant, and there is a reasonable distribution of different types of cases.

3.2 Variable Measurement and Calibration

The four values of the fuzzy-set calibration system are assigned to each conditional variable and outcome variable as 0, 0.33, 0.67, or 1. The outcome variable (O) is the high-intensity generation of medical-related online public opinion, and the three main indicators for measuring it are communication heat, media impact and social impact. The distribution norms of all the conditional variables and the indicator variable are shown in Table 1.

Variable	0	0.33	0.67	1
C1	Irrelevant	Isolated Disputes	Hospital with Historical Disputes	Long-term Systemic Accumulation
C2	Pure Individual Case	Slightly System-related	Involving Hospital Management / Supervision	Involving Medical Insurance / Healthcare Reform / Top-level Systems
C3	No Emotional Response	Emotional Response without Tragedy	Death without Vulnerable Groups	Vulnerable Groups + Death / Severe Injury
C4	Facts Clearly Established	Core Facts Clear with Ambiguous Details	Core Facts Ambiguous	Complete Information Vacuum
C5	No Media Coverage	Local Media Coverage	National Media Coverage + Hot Search	CCTV / Leading Media + Continuous In-depth Coverage
C6	No Harm Caused	Harm without Fatality	Fatality / Permanent Impairment	Fatality + Highest Severity Level
C7	Ordinary Subjects	Moderately Prominent Subjects	Nationally Renowned / Vulnerable Subjects	Top-tier Hospitals + Prominent Figures / Most Vulnerable Groups
O	Not Formed	Local Concern	National Attention + Hot Search	Nationwide Heated Discussion + Sustained Follow-up

Table 1. Assignment Criteria for Conditional Variables and Outcome Variables

4. Empirical Analysis: Necessary Conditions and Generation Paths

4.1 Necessity Analysis of Single Variables

According to the necessity analysis, only one of the conditions needs to be met to achieve the goal. The standard for judgment is as follows: If the agreement is greater than 0.9, then it is a necessary condition^[17]. Analysis of the high-intensity outcome (O) and the non-high-intensity outcome ($\sim$ O) was carried out in this paper, and the results are presented in Table 2.

Conditions	(O) Consistency	($\sim$ O) Consistency
C1	0.775	0.582
$\sim$ C1	0.609	0.803
C2	0.615	0.615
$\sim$ C2	0.677	0.678
C3	0.872	0.486
$\sim$ C3	0.357	0.743
C4	0.807	0.55
$\sim$ C4	0.389	0.646
C5	1	0.647
$\sim$ C5	0.324	0.678
C6	0.812	0.413
$\sim$ C6	0.348	0.747
C7	0.762	0.436
$\sim$ C7	0.517	0.843

Table 2. Necessity Analysis Results of Single Variables (Comparison between High-Intensity and Non-High-Intensity Outcomes)

Based on the above analysis, the consistency of media intervention intensity (C5) is 1.000. Therefore, media intervention is considered to be a necessary condition for the strong generation of online public opinion on medical issues. That is to say, all cases of high-intensity public opinion are covered by the media, and without media coverage, there would be no high-intensity public opinion. Therefore, the first is that combustion accelerators are required. The media should not only convey the will of the people but also create and promote this will. The consistency of online emotional arousal intensity (C3) is 0.872, the consistency of information uncertainty (C4) is 0.807, and the consistency of event severity (C6) is 0.812. The three conditions are all close to the necessary condition standard of 0.9; therefore, it can be concluded that most high-intensity public opinion cases are characterized by strong emotional arousal, information uncertainty and high severity. Analysis of the non-high-intensity outcomes shows that the consistency of low doctor-patient contradiction accumulation ($\sim$ C1) is 0.803, and the consistency of low subject particularity ($\sim$ C7) is 0.843; therefore, non-high-intensity cases generally have the characteristics of low contradiction accumulation and low subject particularity.

4.2 Sufficiency Analysis of Condition Configurations

Based on the analysis above, this paper will determine whether the conditions for high-intensity generation meet the necessary requirements by means of a truth table^[17]. Use the fsQCA 3.0 software and set the frequency threshold to 1, the configuration sufficiency consistency threshold to 0.8 and the PRI consistency threshold to 0.7. The three types of solutions in this paper are complex, relatively simple and of medium difficulty. The total coverage is 0.6563 and the total consistency is 0.9861. The specific compositions of all the paths are shown in Table 3.

Configuration	Solution			
	S1	S2	S3	S4
C1				
C2	⊗			⊗
C3				
C4				⊗
C5				
C6				⊗

Configuration	Solution			
	S1	S2	S3	S4
C7				
raw coverage	0.558316	0.463312	0.472591	0.164168
unique coverage	0.128622	0.000142753	0.0321913	0.0321913
consistency	0.983652	1	1	1
solution consistency			0.9861	
solution coverage			0.6563	
Note: ⊗=absence of a core condition; ⊕=presence of a core condition; ¯=absence of a peripheral condition; ⊕=presence of a peripheral condition; Blank = the condition can be either present or absent				

Table 3. Generation Paths of Medical-Related Online Public Opinion.

Path S1 has the following characteristics: it is very conflictual, lacks institutional responsiveness, has high emotional arousal, high uncertainty about information, strong media coverage, and is serious and very specific. The raw coverage of the path is 0.558 and its consistency is 0.984. All the above types of events have the following characteristics in common: the events themselves are serious and emotionally moving; the information is uncertain; the media have been heavily involved; and there is low institutional sensitivity. Path S2 has a high accumulation of conflict, is very sensitive to institutions, has strong emotional arousal, is highly uncertain about information, is heavily influenced by the media, and has a high particularity of subjects, but it does not need to be a serious event. The first cover of this path is 0.463 and the consistency is 1.000. The general features of such an event are that the subjects involved are very specific, the events themselves cause strong emotions, the information is uncertain, the media are heavily involved, but high event severity is not required. Path S3 has the characteristics of high institutional sensitivity, high emotional arousal, high information uncertainty, strong media attention, high severity and high subject particularity, but it does not need to accumulate many contradictions. The first cover of this path is 0.473 and the consistency is 1.000. Path S2 is more serious, but it does not need to have a large number of contradictions. The attributes of the characteristics of Path S4 are as follows: It has a high accumulation of contradictions, low institutional sensitivity, high emotional arousal, low information uncertainty, strong media intervention, low severity, and high particularity of the subject. The first covering and regularity values of this way are 0.164 and 1.000. The first type of event is a private matter. There have been no deaths of patients in such cases, only problems with the personal conduct of well-known hospitals and doctors have arisen. A particular topic can touch people's hearts deeply, and when it is spread widely by the media, many more people will come to know about it.

4.3 Theoretical Interpretation of the Four Core Paths

Based on the analysis results of the complex solutions, the four paths can be divided into four general categories.

The first kind is the contradiction accumulation-dominated way (S1). The main reasons are that there are many conflicts and serious incidents. The long-standing contradictions have made the people angry and spread through the media. Anqing is a typical case of this. There have been some disputes between the hospital and other parties previously. A person had an incorrect tooth pulled and then jumped to their death. The family members and the hospital had different records, and the media widely covered the news. The first is that there is a large amount of combustible material, and the combustion accelerator and ignition temperature will work together.

The second type is the all-factor superposition path (S2). The first attribute of this way is that, in addition to the weight of the problem, all other conditions are also reasonable. Many of the reasons are closely related and together make up the main public opinion movement. Zhoukou is a typical case of the above. Shao Xiaobei had been studying medicine for 30 years and was also known as the "Goddess of Fertility". After seven months of online bullying and many failed attempts to have it reported to the police, she died by suicide. Due to her special position and the strong emotions in the suicide note video, as well as continuous media coverage, a large number of related issues have been raised and public attention has been drawn to it. It does not need to be a serious case; if all the other conditions are serious, the degree of severity can be due to other reasons.

The third kind is the institutional critique-led way (S3). The first reason is that the main causes of changes in public opinion are high institutional sensitivity and high subject particularity. Even if the amount of accumulation of doctor-patient conflict is relatively small, such incidents can still be very serious due to high emotional arousal and wide dissemination by the media. The Gansu lead poisoning case is a typical case of no prolonged conflict between doctors and patients, but there are problems with children and the environment. Therefore, this case has the characteristics of institutional criticism and has attracted the attention of the public and media, leading to a strong movement in public opinion.

The fourth kind is a particular subject type (S4). The working principle of this path is that the main reasons for the formation of public opinion are high subject specificity and strong media intervention. Even if the gravity of the incident is not serious and the information is relatively open, personal conduct problems of well-known hospitals and famous doctors can still attract considerable public attention. The case of Xiao and Dong Ying at the China-Japan Friendship Hospital is a typical representative case. The scandal of a well-known doctor at a top hospital having an extramarital affair aroused strong moral outrage, and after being reported by the media, it spread further and became a high-profile case.

5. Conclusion and Recommendations

5.1 Research Conclusions

According to the Social Combustion Theory and using the fsQCA method, this paper conducts a configurational analysis of 28 cases of online public opinion on medical issues in 2025 and derives the following main results.

Based on the above results, except for the intensity of media intervention (C5), the consistency of the other conditions does not reach the 0.9 threshold. Therefore, it can be concluded that the strong generation of online public opinion on medical issues is not caused by any single factor but by the combination of many circumstances. Second, the only necessary condition for the strong development of medical-related online public opinion is intervention by the media. The consistency of C5 is 1.000; that is to say, all cases of high-intensity public opinion are accompanied by strong media intervention, and without strong media intervention, high-intensity public opinion cannot occur. Therefore, it is known that combustion accelerators are necessary. The media are not only the way people learn about things but also the sources of this information. In addition, there are four main channels for the strong generation of medical-related online public opinion. Based on the analysis of configuration, there are four types of condition configurations that generate strong online public opinion, and they have been organised into the following four categories: the contradiction accumulation-dominated path (S1), the all-factor superposition path (S2), the institutional criticism-dominated path (S3), and the special subject path (S4). All sorts of paths show that the reasons for the high-intensity production of medical-related online public opinion are different. Finally, the reasons for the formation of public opinion are also different. Combustible materials are only necessary in the accumulation of contradictions and do not need to be the conditions for the dominance of institutional criticism or the path of special subjects. Among the combustion accelerators, media intervention is a necessary condition for all paths, and emotional arousal and information uncertainty can be traded off for each other in some paths. The ignition temperature of all the paths is the same, and they are all the basic components of the four paths; however, severity can be replaced by other conditions in some paths.

5.2 Guiding Strategies

Based on the analysis of necessary conditions, media intervention intensity is the only necessary condition for the high-intensity generation of medical-related online public opinion, and thus, the main task of public opinion guidance is to strengthen the release of authoritative information and seize the commanding heights of public opinion^[3]. If there is an accident, the medical institution should promptly release official information through official channels to prevent a lack of information and thus avoid the spread of rumours. At the same time, there are also conditions of information uncertainty and emotional arousal; thus, the response of public opinion should be based on the transparency of information and emotional appeal. Early dissemination of the necessary information about the incident can help reduce the anxiety of the public by providing some understanding and empathy.

According to the division of roads, there will be four corresponding governance strategies in the different directions. At the beginning of the accumulation of contradictions, a regular mode of handling

doctor-patient conflicts should be established to prevent the problems from worsening. If there is public opinion, one should speak the truth about it and not avoid it with evasion. Given all the reasons above, a general response plan will be adopted. Increase the release of information, but be mindful of emotional manipulation and institutional reactions that may further provoke public opinion[7]. Along the path of institutional criticism, doubts in the institutions should be addressed early on; the progress of the investigation and rectification work should be made public; and the public's attention should be diverted from institutional criticism to the resolution of specific cases. Enhance the daily management of famous hospitals and famous doctors to prevent any single person's behaviour from damaging the reputation of the institution in the area of special subject paths. There is a public opinion, so we need to respond promptly and not spread it too thinly. In short, an all-weather public opinion management system will be built to monitor, warn in advance, guide and correct. Media literacy education for medical institutions should be strengthened, crisis communication capabilities need to be improved, social co-governance should be promoted, and a rational and inclusive public opinion environment needs to be created^[18].

5.3 Research Limitations and Outlook

This paper has some faults. The number of cases is small and meets the requirements of fsQCA for small-sample research, but we will need to increase the scope of case selection in the future. Most of the data in the measurement are secondary data, and there may be information bias. Later, some people will combine the questionnaires with other ways to obtain more detailed information about this case. This paper will only examine the cases of domestic medical public opinion in 2025 and will not conduct cross-national comparisons. Later, some people will also be doing so.

The following research directions will be pursued in the future: First, with the help of Big Data and artificial intelligence technology, an intelligent early warning system for public opinion will be constructed. Second, there will be longitudinal comparisons of the actual effects of the guidance strategies at different times. Third, problems in the governance of misinformation and the guidance of public emotion in medical-related public opinion will be further studied to continuously improve the theoretical system for regulating medical-related online public opinion.

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