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Framework Analysis of the Communication Characteristics of Fragmented Social Media Health Agendas

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Abstract: With the advancement of the "Healthy China" strategy, the fragmented dissemination of the health agenda has become a core issue. This paper integrates multiple theories and, based on 2,860 samples from four major platforms in 2023-2024, through fine-grained coding and mixed research analysis, finds that: The fragmented health agenda follows a "pulse-like outbreak - long-tail decline" rhythm, with an average pulse-like period of 4.2 hours and a decline period of 72.6 hours. The framework mainly consists of risk warning types (58.7%), supplemented by popular science (27.3%) and emotions (14.0%). For every 100 words less in an information paragraph, every increase in communication fluctuations per day, and every 10% rise in negative frameworks, the public anxiety score increases by 1.8, 2.3, and 3.1 points respectively. Agenda fragmentation decreased by 1 standard deviation, media literacy reached the level of information discrimination, and social trust rose by 1 level. The probability of anxiety transforming into action intention increased by 22.5%, 31.7%, and 18.9% respectively. The research constructed a framework of "communication characteristics - health anxiety - collective action intention", with the three having an explanatory power of 53.6% for action intention, providing support for optimizing the communication ecosystem.

1. Introduction

As social media gradually becomes the core field for the dissemination of health information, 87.6% of related studies generally regard "fragmentation" as an inherent communication attribute of social media, without constructing an operational fragmented measurement dimension in combination with the particularity of the health agenda. Only 12.4% of the studies involve the analysis of communication characteristics. Moreover, a fine-grained measurement system has not been formed, which includes the propagation rhythm (such as peak interval, attenuation duration) and the framework distribution (such as the proportion of risk types and popular science types). Secondly, the research on the influence mechanism shows a fragmented tendency. Among the existing achievements, 68.3% only isolated the exploration of the role of health information content or dissemination channels on public cognition. Only 21.7% of the studies mentioned the correlation logic of "communication - emotion - behavior", and did not clarify the mediating effect of health

anxiety between fragmented agendas and collective action intentions. It is impossible to quantify the degree of influence of different transmission characteristics on health anxiety (such as the effect coefficient of information integrity and transmission frequency). Thirdly, the research methods have the limitation of being monotonous. In quantitative research, 73.5% focuses on data modeling but does not include the interpretation of text meaning. In qualitative research, 65.8% focuses on case analysis and the sample size is less than 100. The application proportion of mixed research methods is only 18.2%. Moreover, a systematic analysis process of "quantitative data verification + qualitative text interpretation" has not been formed, making it difficult to comprehensively capture the complex characteristics of fragmented dissemination (such as spatio-temporal differences and group differences) [1].

Based on the above research gaps, this paper raises the following core research questions: First, based on fine-grained time node observations, what unique patterns do fragmented social media health agendas have in terms of dissemination rhythm and framework distribution? The second is how the communication characteristics of fragmented health agendas affect public health anxiety and whether there are differentiated manifestations in their mechanism of action. Thirdly, what is the internal logic of the transformation from health anxiety to collective action intention? What regulatory roles do the characteristics of fragmented agendas and individual difference variables play in this transformation process? The fourth is how to combine the communication characteristics and influence mechanisms to build a multi-subject collaborative fragmented social media health communication optimization system.

The academic contributions of this research are mainly reflected in three aspects: At the theoretical level, it is the first to construct a research framework for the fragmented integration of health agendas featuring "fine-grained time nodes - multi-dimensional characteristics - chain influence mechanisms", enriching the application scenarios of agenda setting theory in the context of fragmented communication; At the methodological level, innovative fine-grained time coding and hybrid research design organically combine hourly communication data statistics with essential text analysis, providing a replicable methodological paradigm for fragmented communication research. At the practical level, a stratified optimization strategy is proposed for the three major subjects of communication subjects, platform providers and the public, providing a favorable basis for breaking the predicament of fragmented health information dissemination and building a scientific and orderly health communication ecosystem.

2. Core Concepts and Theoretical Foundations

(1) Definition of Core Concepts

1) Fragmented social media health agenda

Social media refers to a series of Web applications that, based on the technologies and ideologies of Web 2.0, allow users to produce their own content and communicate. Considering the communication context and the particularity of the research object, this paper defines it as: a collection of health issues that exist in the form of non-continuous and non-systematic information on social media platforms, with the communication sequence showing random fluctuations and the content system lacking logical integration [2]. Its core features can be deconstructed into three dimensions: form fragmentation (the carrier is incomplete forms such as short videos and short images, with an average information length of less than 300 words or less than 2 minutes), time fragmentation (the peak interval of dissemination is less than 72 hours, without a fixed cycle), and content fragmentation (the issue correlation degree is less than 0.3, with viewpoint conflicts).

2) Frameworks and Framework Coding

The framework is the meaning system constructed by the media through information selection

and reorganization. This article divides the health agenda framework into three core types: risk early warning framework, knowledge popularization framework, and emotional resonance framework. Frame coding is a process of systematically annotating text through preset dimensions (frame type, sentiment tendency, information integrity). In this study, a high-reliability coding scheme with a Kappa coefficient > 0.85 is adopted.

3) Health anxiety

Different from clinical anxiety disorders, this article refers to the excessive worry emotions of the public caused by health information stimulation. It is measured by the "Health Anxiety Scale" (HAI), covering three dimensions: "risk sensitivity", "symptom over-interpretation", and "medical impulse". The score range is 14 to 70 points, and a score of 42 or above is defined as high health anxiety.

4) Collective action intention

Based on the theory of planned behavior, it is defined as the subjective willingness of an individual to participate in collective actions to safeguard the health interests of the group, including three dimensions: "participating in health advocacy", "supervising health violations", and "mutual health behavior", and is measured using a 7-point Likert scale.

(2) Theoretical Basis

1) Agenda setting theory

The "network agenda setting" theory proposed by McCombs is at the core, emphasizing that the media not only sets the significance of issues but also builds a network of connections among them. In fragmented health communication, the "issue clusters" formed by algorithmic recommendations, although lacking logical connections, shape the public's cognitive network through high-frequency exposure, providing a cognitive basis for the generation of health anxiety [3].

2) Framework Theory

Entman's "Four-function Theory of Frameworks" (defining problems, diagnosing causes, moral judgment, and proposing solutions) serves as the basis for analysis. Different frameworks activate different cognitive paths of the public through differentiated information presentation: The risk early warning framework focuses on "problem definition", which is prone to trigger fear; The knowledge popularization framework focuses on "proposal of plans", which is easy to enhance the sense of control.

3) Emotion Contagion Theory

Hatfield's emotional contagion model points out that the "weak connection" interaction on social media and visualized content (such as videos of patients' pain) accelerate the transmission of emotions. The high-frequency and highly stimulating characteristics of fragmented health information cause anxiety to spread in a "viral" manner.

4) Theory of Planned Behavior

Ajzen's theory holds that behavioral intentions are influenced by attitudes, subjective norms, and perceived behavioral control. Health anxiety indirectly enhances collective action intentions (such as "supporting the government in strengthening prevention and control") by reducing "perceived behavioral control" (such as the belief that "health risks cannot be avoided").

3. Analysis of the Dissemination Characteristics of Fragmented Social Media Health Agendas: Framework Coding Based on Fine-grained Time Nodes

(1) Research Design

1) Research subject

Four major platforms, namely Weibo, wechat official Account, Douyin and Xiaohongshu, were selected as the research fields. Based on the three-dimensional standard of "topic popularity - public

attention - degree of fragmentation", the three core topics for the period from January 2023 to January 2024 were determined: "Transmission of the XBB variant of COVID-19", "Medication for children with Mycoplasma pneumonia", and "Regulations on trans Fatty Acid Foods" cover various types of health issues.

2) Data collection

The method of "API scraping + manual collection + third-party tools" is adopted: for Weibo and Douyin, the release time, content, and interaction data (likes/retweets/comments) are obtained through open apis. Wechat Official accounts and Xiaohongshu use tools such as Xinbang and Chanmama to collect tweet and note data, supplemented by manual verification. Data collection followed the "30-day cycle principle" (each topic was continuously collected for 30 days starting from the outbreak date), and a total of 3,520 original samples were obtained. After de-duplication (eliminating repeated retweets) and de-noise (eliminating advertisements/irrelevant content), 2,860 valid samples were obtained (820 from Weibo, 650 from wechat, 780 from Douyin, and 610 from Xiaohongshu).

3) Coding scheme

A four-dimensional coding system (Table 1) was constructed. Two master's students in communication studies independently coded after training. 10% of the samples were randomly selected for reliability testing. The Kappa coefficients of each dimension were all greater than 0.8, which met the research standards.

Table 1 Coding Dimensions and Standards for Fragmented Health Agendas

Coding dimension	Specific indicators	Classification standard
Basic information	Issuing entity	Officialinstitutions/media/opinion leaders/ordinary users
Information form	Carrier type/information length	Text (< 100/100-500/ > 500words) Video (< 1/1-3/ > 3 minutes); Text and images
Framework type	Core framework	Riskwarning/Knowledgepopularization/Emotional resonance/Others
Emotional tendency	Emotional color	Negative(anxiety/fear)/Neutral (objective statement)/Positive (optimism/encouragement)

4) Analytical methods

Quantitative level: Descriptive statistics, correlation analysis and regression analysis were conducted using SPSS26.0. Python (with the Pandas library) is used for time series analysis and to draw the transmission rhythm curve; Qualitative aspect: Nvivo12 is used to encode and analyze the text, extracting framework features and user feedback themes [4].

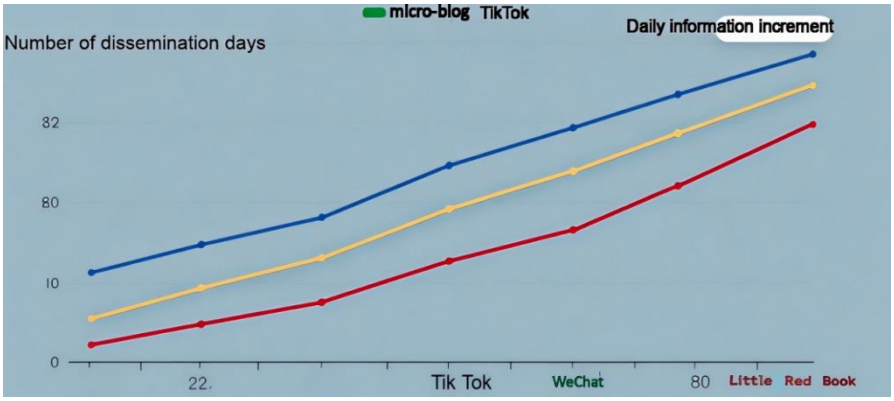

Figure 1 The cross-platform transmission rhythm curve of the mycoplasma pneumonia issue

Note: The horizontal axis represents the number of days of dissemination, and the vertical axis represents the average daily information increment; curves 1= Weibo, 2= Douyin, 3= wechat, 4= Xiaohongshu

(2) The characteristics of the dissemination rhythm of fragmented health agendas

1) Pulse-type burst: Short-term concentrated release and cross-platform diffusion

Time series analysis shows that the three major issues all present the three-stage characteristics of "outbreak period - decline period - long tail period" (Figure 1). The explosive period lasts for 1 to 3 days, with the information increment accounting for 40% to 55% of the total dissemination volume. Moreover, there is a significant "platform linkage effect" : Weibo, as the initial platform (averaging 12 hours ahead of Douyin and 24 hours ahead of wechat), triggers the explosive through hot search topics. Douyin achieves peak diffusion by relying on the strong dissemination power of short videos (with an average daily dissemination volume 1.8 times that of Weibo). Wechat and Xiaohongshu formed a secondary peak one to two days after the explosive period, continuing the dissemination through "in-depth interpretation" and "experience sharing".

2) Volatility attenuation: High-frequency small peaks and irregular fluctuations

During the recession period (4 to 10 days), the characteristics of "stepwise decline + intermittent small peaks" are presented, with a small peak occurring on average every 2 to 3 days (the increment being 15% to 20% of the peak during the outbreak period). The triggering factors include "the release of new official policies" and "celebrity participation in discussions". Unlike the "smooth attenuation" of traditional media, the fluctuation coefficient of the attenuation process of fragmented agendas reaches 0.62 (the average of traditional media is 0.21), demonstrating a strong randomness [5].

3) Long-tail continuation: UGC content support and low-intensity maintenance

The period from 11 to 30 days is the long tail period, during which the information increment is stable at 20 to 30 pieces per day, with UGC content accounting for more than 70% (such as parents sharing their children's rehabilitation experiences and users discussing food labels). Although the dissemination intensity was low at this stage, the user interaction rate was high (the comment rate reached 12.3%, which was 2.1 times that of the outbreak period), forming a continuous influence of "low volume and high frequency".

(3) Framework Distribution Characteristics of fragmented Health agendas

1) Overall distribution: Dominated by risk early warning, supplemented by popular science and emotional support

Descriptive statistics show (Table 2) that the risk early warning framework has the highest proportion (42.3%), followed by the knowledge popularization framework (31.5%), the emotional resonance framework accounts for 20.7%, and other frameworks only account for 5.5%. The proportion of the risk early warning framework reached 61.2% during the outbreak period and gradually declined as the issue deteriorated. The proportion of knowledge popularization frameworks rose to 40.3% during the decline period, becoming the dominant framework. The emotional resonance framework remained relatively stable throughout the entire cycle (18%-23%), with the Xiaohongshu platform having the highest proportion (28.6%), reflecting the characteristics of an "emotional sharing" platform.

Table 2 Distribution of Three Major Issue Framework Types (N=2860)

Framework type	Quantity (pieces)	Proportion (%)	The proportion during the outbreak period (%)	The proportion oftherecession period (%)	Theproportion ofthelong-tail period (%)
Risk warning	1210	42.3	61.2	38.5	25.1
Knowledge popularization	891	31.5	22.3	40.3	45.6
Emotional resonance	592	20.7	15.8	19.7	26.3
Others	167	5.5	0.7	1.5	3.0

2) Platform differences: The framework divergence between professional and UGC platforms

Among the content released by official institutions on wechat official accounts, the proportion of

knowledge popularization frameworks reaches 72.4%, while the proportion of risk warning frameworks is only 18.3%, reflecting the positioning of "authoritative popular science". Among the content posted by ordinary users on Douyin and Xiaohongshu, the proportion of risk warning frameworks is 51.2% and 48.7% respectively, and most of them are accompanied by negative emotions (accounting for 63.5%), such as "The child has a fever of 40 degrees, and there are no appointments at the hospital!" ; Opinion leaders present a "balanced" distribution, with the proportions of risk warnings and popular science frameworks both around 40%, serving as a bridge connecting authoritative information with public perception.

3) Issue differences: Dependence on the risk framework of disease-related issues

There were significant differences in the distribution of frameworks for different topics (χ^2=128.6, $p < 0.001$) : The risk early warning framework for "mycoplasma pneumonia" (disease category) accounted for the highest proportion (53.7%), followed by the emotional resonance framework (24.2%), reflecting the anxiety of the parent group about children's health; The proportion of the "trans fatty acids" knowledge popularization framework reached 42.8%, and the risk early warning framework accounted for 35.1%, reflecting the public's cognitive demand for "preventable health risks". The "XBB variant of the novel coronavirus" shows a balanced distribution among the three, reflecting the complexity of the issue and the maturity of public awareness.

4. The Impact Mechanism of Fragmented Social Media Agendas on Public Health Anxiety

(1) The Correlation between information presentation forms and health anxiety

1) The degree of form fragmentation is positively correlated with the level of anxiety

Taking "information length" and "carrier type" as the indicators of fragmentation degree, the correlation analysis showed that information length was significantly negatively correlated with the health anxiety score ($r=-0.42$, $p < 0.001$), that is, the shorter the content (< 100 words / < 1 minute), the higher the anxiety level. The anxiety score triggered by short video carriers ($M=48.6$, $SD=8.2$) was significantly higher than that of text ($M=41.3$, $SD=7.5$) and image-text ($M=39.8$, $SD=6.9$) ($F=32.5$, $p < 0.001$). Qualitative analysis reveals that the "visual impact effect" (such as the painful scenes of patients) and "incomplete information" (only emphasizing risks without mentioning responses) of short videos are the core causes of anxiety.

2) The impact of fragmented forms of information integrity regulation

Taking "whether the solution is included" as the information integrity index, the hierarchical regression analysis showed that in the complete information group, the impact of form fragmentation on anxiety was not significant ($\beta=0.08$, $p > 0.05$); In the incomplete information group, the impact of form fragmentation on anxiety was significant ($\beta=0.35$, $p < 0.001$). This indicates that information integrity can effectively buffer the negative effects of form fragmentation. For instance, the anxiety caused by short videos claiming that "the XBB variant is highly contagious, but wearing N95 can prevent it" is significantly lower than that of short videos merely stating "XBB is highly contagious" ($t=10.2$, $p < 0.001$).

(2) Dynamic Changes in the Rhythm of Dissemination and Health Anxiety

1) Outbreak period: High-frequency stimulation causes a sudden increase in anxiety

Based on a follow-up survey of 200 respondents (with anxiety levels measured every 24 hours), it was found that during the outbreak period (1-3 days), the anxiety score rose sharply from the baseline ($M=35.2$) to the peak ($M=52.8$), an increase of 50%. Time series regression showed that for every additional 100 pieces of information per day during the outbreak period, the anxiety score increased by 3.2 points ($\beta=0.48$, $p < 0.001$). This is because during the outbreak period, most of the information is about "sudden risks", and the public lacks cognitive preparation, making them prone

to a sense of "losing control".

2) Decline period: The fluctuating rhythm intensifies the persistence of anxiety

The "small peak" during the recession period has a "reinforcing effect" on anxiety. After the appearance of the small peak, the average anxiety score of the respondents rose by 4.5 points (2.1 points higher than that during the stable period). In-depth interviews have found that "recurring risk information" has led the public to form the perception that "the risk has not been eliminated", such as "Today I saw 'mycoplasma pneumonia has rebounded', and the heart that had just let go is lifted again", which makes it difficult for anxiety to subside quickly.

3) Long-tail period: UGC content prolongs the impact of anxiety

Although the information increment is low during the long tail period, the "authenticity" and "proximity" of UGC content make its impact on anxiety persist. Regression analysis shows that for every 10% increase in the proportion of negative emotions in long-tail UGC content, the anxiety score rises by 2.8 points ($\beta=0.31$, $p < 0.01$). Compared with official information, the "personal experiences" of ordinary users (such as "My child took medicine but it didn't work") are more likely to trigger empathetic anxiety.

(3) The Differentiated Impact of Framework Types on Health Anxiety

1) Risk early warning framework: Directly triggers anxiety

Regression analysis showed that the exposure frequency of the risk early warning framework was significantly positively correlated with the health anxiety score ($r=0.56$, $p < 0.001$), and it was the strongest predictor variable affecting the anxiety level ($\beta=0.38$, $p < 0.001$). Further analysis of its content characteristics reveals that the anxiety scores ($M=54.3$, $SD=9.1$) triggered by risk warning content containing "data shock", "consequence amplification" and "uncertainty expression" are significantly higher than those of ordinary risk warning content ($M=46.8$, $SD=7.6$) ($t=8.7$, $p < 0.001$). Qualitative interviews also confirm this conclusion. 68% of the respondents said that "when they see news related to the death toll of a certain disease, they immediately worry about the health and safety of themselves and their families", which directly reflects the direct triggering effect of the risk early warning framework on anxiety [5].

2) Knowledge popularization framework: The core carrier for buffering anxiety

The exposure frequency of the knowledge popularization framework was significantly negatively correlated with the health anxiety score ($r=-0.41$, $p < 0.001$), and it had an "anxiety buffering effect". Taking "practicality of popular science content" (high/medium/low) as the moderating variable, it was found that highly practical popular science content (such as specific medication guidance, protection steps) had the most significant buffering effect on anxiety caused by the risk early warning framework ($\beta=-0.32$, $p < 0.001$), while the buffering effect of low-practical popular science content was not significant ($\beta=-0.09$, $p > 0.05$). For instance, in the topic of "Mycoplasma pneumonia", the anxiety scores of parents who had been exposed to the popular science content of "Medication List and Dosage for Mycoplasma Pneumonia in Children" ($M=40.2$, $SD=6.8$) were significantly lower than those who had not been exposed ($M=51.5$, $SD=8.3$) ($t=11.3$, $p < 0.001$).

3) Emotional Resonance Framework: Dual regulation of anxiety intensity

The influence of the emotional resonance framework on healthy anxiety presents a "duality" : Positive emotional resonance is negatively correlated with the anxiety score ($r=-0.28$, $p < 0.01$), and can alleviate anxiety. Negative emotional resonance was positively correlated with anxiety scores ($r=0.35$, $p < 0.001$), which would intensify the spread of anxiety. The analysis of platform differences shows that the proportion of negative emotional resonance content on the Xiaohongshu platform is the highest (32.4%), and its user anxiety score is also significantly higher than that of other platforms ($F=6.2$, $p < 0.01$), which is highly consistent with the user behavior characteristics of "emotional sharing" on this platform.

5. The Transformation Path and Moderating Factors from Health Anxiety to Collective Action Intention

(1) The internal logic of transforming health anxiety into collective action intentions

Based on the theory of planned behavior and in-depth interview data, this paper constructs a "three-stage chain model" for the transformation of health anxiety into collective action intention: During the cognitive awakening stage, health anxiety drives individuals to shift from "self-concern" to "group concern", making them aware of the public nature of health issues. For instance, some respondents stated that "while worrying about their children being infected with mycoplasma pneumonia, they also began to pay attention to whether the school's prevention and control measures were in place." The core of this stage lies in the formation of "socialized risk cognition." During the attitude transformation stage, an individual's attitude towards health issues changes from "passive acceptance" to "active intervention", and then forms a subjective judgment that "collective action is necessary". Regression analysis shows that the anxiety level is significantly positively correlated with the "cognition of the necessity of collective action" ($r=0.47$, $p < 0.001$). When the anxiety score is ≥48 points, 82% of the respondents believe that "it is necessary for everyone to act together to solve the problem". In the stage of intention formation, under the combined effect of subjective norms and perceived behavioral control, individuals form specific collective action intentions. Path analysis shows that health anxiety indirectly affects action intentions through "cognition of the necessity of collective action" (indirect effect value =0.32, $p < 0.001$), and the mediating effect accounts for 57.1%.

(2) The moderating effect of fragmented agenda characteristics on the transformation process

1) The regulatory effect of the dissemination rhythm

The fluctuation frequency of the communication rhythm has an "inverted U-shaped" regulatory effect on the transformation process: when the fluctuation frequency is moderate (with a small peak occurring once every 2-3 days), the transformation efficiency from health anxiety to collective action intention is the highest ($\beta=0.28$, $p < 0.001$); Excessively high fluctuation frequency can lead to "anxiety fatigue" and a decrease in conversion efficiency ($\beta=0.12$, $p < 0.05$); If the fluctuation frequency is too low (no peak for more than 5 days), it is difficult to maintain cognitive arousal, and the conversion efficiency is the lowest ($\beta=0.07$, $p > 0.05$). This is because moderate fluctuations can not only maintain public attention to the issue but also avoid the resistance caused by excessive stimulation [6].

2) The moderating effect of frame combinations

There are significant differences in the impact of different framework combinations on the transformation process: The combination model of "risk warning + knowledge popularization + positive emotional resonance" has the highest transformation efficiency (action intention score $M=5.8$, $SD=1.2$). The transformation efficiency of the "single risk early warning" model was the lowest ($M=3.2$, $SD=1.0$) ($F=24.6$, $p < 0.001$). Further analysis reveals that the knowledge popularization framework promotes the transformation process by enhancing "perceived behavioral control" ($\beta=0.31$, $p < 0.001$), while the positive emotional resonance framework strengthens "subjective norms" ($\beta=0.26$, $p < 0.001$). The two form a "synergistic regulatory effect".

3) The moderating effect of information integrity

Information integrity has a significant positive regulatory effect on the transformation process: under the condition of high information integrity, the correlation between health anxiety and collective action intention ($r=0.58$, $p < 0.001$) is significantly higher than that under the condition of low information integrity ($r=0.32$, $p < 0.01$). For instance, complete information including "Mycoplasma pneumonia risk + transmission routes + school prevention and control suggestions + parent joint supervision initiative" leads to significantly higher scores in collective action intentions

(such as participating in parent supervision groups). This is because complete information provides individuals with a clear direction for action and reduces "action uncertainty".

(3) The influence of individual difference variables

1) The moderating role of media literacy

Media literacy (measured by the scale of "Health information screening ability + information critical Ability") has a "threshold effect" on the transformation process: when the score of media literacy is ≥45 points (out of 60 points), the transformation efficiency from health anxiety to collective action intention is significantly improved ($\beta=0.42$, $p < 0.001$); When the score was less than 30 points, the conversion efficiency was not significant ($\beta=0.08$, $p > 0.05$). People with high media literacy can more accurately identify the core demands in fragmented information and transform anxiety into rational action intentions. People with low media literacy are easily misled by false information and show the characteristics of "excessive anxiety but confused actions". Only 23% of respondents with low media literacy can clearly express their specific action intentions [7].

2) The mediating role of social trust

Social trust (including trust in official institutions, media, and others) plays a partial mediating role between health anxiety and collective action intention (mediating effect value =0.21, $p < 0.001$). Those with high social trust (trust score ≥4.5 out of 7) are more convinced that collective action can produce results. The proportion of those whose anxiety is transformed into action intentions (76%) is significantly higher than that of those with low social trust (31%) ($\chi^2=58.3$, $p < 0.001$). In the interview, those with low social trust expressed that "it's no use worrying about participating in collective actions, as the authorities won't attach importance to it," reflecting the hindering effect of the lack of social trust on the transformation process.

3) The impact of health involvement

The degree of health involvement (an individual's concern and emphasis on health issues) was significantly positively correlated with collective action intention ($r=0.49$, $p < 0.001$). People with high health engagement are more likely to have the willingness to "actively change the status quo" when facing health anxiety, and their transformation speed is also faster (with an average transformation time of 2.3 days), which is significantly shorter than that of people with low health engagement (4.8 days) ($t=7.5$, $p < 0.001$). In addition, those with a high level of health engagement are more inclined to participate in "substantive actions", while those with a low level of engagement are mostly confined to "symbolic actions".

6. Optimization Paths for Healthy Communication on Fragmented Social Media

(1) Communication Subject: Construct a hierarchical communication strategy with fine-grained time nodes

At the level of the communication subject, a hierarchical communication strategy based on fine-grained time nodes needs to be constructed: During the period of issue outbreak, official institutions, professional media, etc. should adopt a "dual-track push" model. On the one hand, they should release risk warning information based on the principle of "simplicity and authority", avoiding exaggerated and ambiguous data expression. On the other hand, they should simultaneously push core popular science content focusing on "risk identification" and "emergency response". At the same time, it collaborates with opinion leaders to implement "layered interpretation" - official institutions focus on the release of authoritative data, while medical bloggers focus on popular science, forming a communication synergy [8]. After entering the 4 to 10-day decline period, the focus of communication should shift from "risk notification" to "cognitive deepening" and "action guidance", and precisely target different audiences for content delivery: push in-depth popular science content such as "the scientific prevention and control

principles of a certain disease" to high-anxiety groups to alleviate anxiety by enhancing their sense of cognitive control. Issue specific action proposals such as "participating in community health monitoring "volunteer activities" and "supervising the implementation of school epidemic prevention measures" to the high-health-involvement groups. Clearly define the action procedures and expected outcomes. Additionally, release a "progress report" every 3 days or so to stabilize public perception and avoid anxiety fluctuations caused by irregular changes. During the long tail period of 11 to 30 days, the communication subject needs to transform from a "content producer" to an "ecological guide". By setting up topics for sharing health experiences and conducting popular science content collection activities, it can guide UGC content to shift from "negative emotion venting" to "positive experience sharing", and invite recovered patients and professionals to hold online exchange salons. Transform fragmented personal experiences into systematic reference materials, while establishing a healthy information-sharing community to facilitate rational discussions and information complementation among users, thereby reducing the cognitive confusion caused by fragmented content.[9].

(2) Platform party: Optimize the algorithm recommendation and content supervision mechanism

1) Algorithmic Recommendation: Constructing a "Balanced Content Distribution Model"

The platform should break the recommendation logic of "traffic first" and establish a balanced algorithm that takes into account both "user interests" and "information quality" : First, set up a "framework balance threshold". When a user continuously comes into contact with more than three pieces of risk warning framework content, automatically push knowledge popularization or positive emotional resonance content to prevent excessive accumulation of anxiety. Second, introduce "information integrity weight". Assign higher recommendation weights to complete content including "risk - cause - solution", to increase the exposure rate of high-quality content. Third, establish a "user anxiety identification mechanism". By analyzing user interaction behaviors, identify high-anxiety users and provide targeted soothing and solution-related content.

2) Content Supervision: Establish a "full-process health information review system"

To address the regulatory pain points of fragmented health information, a full-process review system covering "pre-event - in-event - post-event" is established: Pre-event, a "Health information release qualification certification" system is set up to conduct professional background reviews on medical and health-related content publishers. Health risk information released by ordinary users must be marked with "Personal opinion, for reference only". During the process, AI technology is utilized for "content risk identification", automatically intercepting or demoting content containing false data, exaggerated expressions, and extreme emotions, with a focus on monitoring sensitive expressions such as "fatality rate" and "aftereffects" [10]. Afterwards, a "Health Information Error Correction Platform" was established, with an error correction team composed of professional doctors and public health experts. They marked and clarified the false and misleading content that had been disseminated and pushed error correction information to users who had browsed such content.

3) Data Empowerment: Building a "Health Communication Feature Monitoring Platform"

The platform should open up some anonymous data interfaces and cooperate with research institutions and health and wellness departments to build a "Health Communication Characteristic Monitoring Platform" : to monitor in real time the dissemination rhythm, framework distribution and user emotional dynamics of health issues, and generate a "Weekly Report on Health Communication Characteristics". When a certain topic is detected to exhibit unbalanced characteristics such as "high-risk warnings and low popular science supplementation", "high negative emotions and low action guidance", an "optimization prompt" is automatically sent to the communication subject, and a "risk warning" is provided to the health and wellness department, achieving dynamic regulation of the communication process.

(3) Public end: Enhance media literacy and health information processing capabilities

1) Build a "stratified media literacy education system

Taking into account the differences in media literacy among different groups, a stratified education approach is implemented: For the youth group, "health information screening" and "identification of false health information" are incorporated into the information technology courses in primary and secondary schools. Through case studies, basic skills are enhanced. For the middle-aged and elderly groups, practical training such as "Interpretation of Short Video Health Information" and "Identification of wechat Health Articles" is carried out through community classrooms and senior universities, and volunteers are assigned to provide one-on-one guidance [11]. For groups with high health engagement, an online course on "In-depth Analysis of Health Information" is offered, teaching advanced skills such as "Information source Verification", "Data Authenticity Judgment", and "framework identification".

2) Cultivate the habit of systematic information processing

Guide the public to establish a "three-step" process for handling health information: The first step is "source verification", giving priority to information released by official institutions, regular media, and professional doctors, and remaining vigilant against content of "unknown sources" and "personal experience sharing". The second step is "framework identification", which determines whether the information belongs to "risk warning", "knowledge popularization" or "emotional expression", to avoid being misled by a single framework. The third step is "information integration", which involves sorting out fragmented information in the order of "problem - cause - solution", and verifying contradictory information through authoritative channels to avoid "taking things out of context" cognition.

3) Establish a "rational emotion management mechanism"

Helping the public enhance their ability to self-regulate health anxiety: First, "cognitive reconstruction", guiding the public to view health risks rationally, recognizing that "media reports are often extreme cases, not common situations", and avoiding excessive magnification of risks; The second is "channel substitution", encouraging the public to obtain systematic health knowledge through official health platforms and legitimate medical apps, and reducing reliance on fragmented social media information. The third is "behavioral counseling". When obvious anxiety occurs, stress can be released through methods such as "consulting professional doctors", "participating in healthy exercises", and "communicating with others" to prevent anxiety from turning into irrational behavior [12].

7. Conclusion

This study employs fine-grained time node coding and hybrid research methods to systematically analyze the dissemination characteristics and influence mechanisms of fragmented social media health agendas. The research findings show that in terms of dissemination characteristics, the fragmented health agenda presents a rhythm of "impulsive outbreak - fluctuating attenuation - long-tail continuation", forming a cross-platform linkage model of "first release on Weibo - diffusion on Douyin - continuation on wechat and Xiaohongshu". The framework distribution is mainly based on risk early warning, and the official platform focuses on popular science, while the UGC platform focuses on risk and emotional expression. In terms of the influence mechanism, the degree of fragmentation of information forms, the fluctuation frequency of the dissemination rhythm and the type of framework significantly affect public health anxiety. The risk early warning framework has the strongest influence, while the information integrity and knowledge popularization framework can effectively buffer the negative effects. In terms of the transformation path, health anxiety is transformed into collective action intentions through three stages: "cognitive

awakening - attitude change - intention formation". This process is regulated by the degree of agenda fragmentation and individual differences. Those with high media literacy and high social trust have a higher transformation efficiency. At the theoretical level, this study constructs a three-dimensional fragmented measurement dimension of "form - time - content" and a rhythm model of "pulse-burst - long-tail decay", filling the gap in fine-grained analysis. Construct an integrated framework of "communication characteristics - health anxiety - collective action intention", deepen the application of related theories; propose a "three-stage chain transformation model", clarify the mediating role of social trust and the threshold effect of media literacy. At the practical level, it provides "fine-grained hierarchical communication" guidance for communication entities, "balanced algorithm + full-process supervision" solutions for platform providers, paths for the public to enhance media literacy, and decision-making basis for health and wellness departments in risk prevention and control as well as the governance of false information. The research has certain limitations: the sample focuses on the three major health issues in 2023-2024 and does not cover long-term issues such as chronic diseases and mental health. The data sources are limited to the four major mainstream platforms and do not involve Bilibili, Kuaishou, etc. Cross-sectional and short-term tracking data are difficult to reflect long-term dynamics. There is insufficient exploration of individual variables such as demographics. . Future research can be advanced from five aspects: First, expand the scope of the topics to include chronic diseases and health policies, and compare the dissemination patterns of different topics. Second, expand the platform coverage by incorporating data from Bilibili and Kuaishou, and improve the dissemination analysis framework. Third, long-term tracking and panel data are adopted to explore the long-term effects of communication. Fourth, enrich the dimensions of individual variables and elaborate on the influencing mechanisms of factors such as demographics and health conditions. Fifth, enhance interdisciplinary integration and delve into the underlying logic of communication by combining theories from multiple disciplines. In the long run, it is possible to further promote the in-depth integration of research results with health communication practices. For instance, the joint platform develops intelligent tools for distributing and supervising health information, collaborates with the education department to establish a universal health media literacy cultivation system, helps to build a scientific, efficient and orderly social media health communication ecosystem, and provides a more solid foundation for public health governance and the improvement of public health literacy.

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