Mapping the AIDS Week Health Campaign on Social Media in China: A Mixed-Method Study

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This study aimed to explore the dissemination of HIV/AIDS-related information and risk factors on social media during AIDS Weeks, helping policymakers and public health organizations understand how the public utilizes social media to formulate strategies for AIDS health campaigns better. This study used Latent Dirichlet Allocation (LDA) topic modeling and sentiment analysis to investigate the distribution of themes and people's reactions during AIDS Weeks. Additionally, Critical Discourse Analysis (CDA) was employed to further examine the social structures, cultural contexts, and power dynamics underlying the discourse. From 2018 to 2021, 32,876 posts were analyzed, revealing 21 topics coded and categorized into six main themes: Response Methods, Specific Topics, Promotion, Virus Status, Specific Groups, and Positive Feedback. Critical discourse analysis uncovered a parallel trend of demonstrating both threat and efficacy in AIDS Week promotion in China. However, the lack of actionable prevention information may reduce behavioral intentions. The top-down implementation approach ensures efficient execution at all levels but also results in formalism during AIDS Week. Text themes vary annually based on slogans and social contexts, requiring localization for effective implementation and overcoming cultural barriers detrimental to health promotion. Cultural context and social structures contribute to issues such as formalism and stigmatization of marginalized groups. We suggest enhancing user engagement and interaction through social platforms during AIDS Week activities. Collaboration between public health organizations and social media companies can further increase public awareness of the disease, mitigate societal biases, and provide accurate and practical prevention guidance.

Keywords: HIV/AIDS; Health campaign; Data mining; Topic model; Chinese social media

Introduction

While significant progress has been made in the global fight against HIV, China's vision for ending the epidemic confronts several challenges. According to the Chinese Center for Disease Control and Prevention, HIV/AIDS accounted for 19,623 (88.4%) of the total 22,198 deaths caused infectious diseases nationwide (Disease Prevention and Control Bureau, 2022). HIV/AIDS transmission through blood transfusion has been primarily blocked, and injection drug use and mother-to-child transmission have been effectively controlled, with sexual transmission becoming the main route of transmission (Prevention, 2019). However, China's large population, imbalanced incidence, and uneven geographic development have led to a wide range of sexual transmission (He et al., 2022). Furthermore, the traditional repression of sexuality in China has led to widespread stigma and social discrimination, further complicating the factors affecting HIV and impedes intervention efforts.

To address these challenges, the Chinese government organizes AIDS Week public health campaigns annually on December 1st, aligning with the United Nations' World AIDS Day. Throughout the following week, the Office of the State Council Working Committee on AIDS Prevention and Control issues guidelines for proactive publicity and educational activities. These initiatives aim to raise awareness and educate the public about HIV/AIDS. During this week, social media platforms in China played a crucial role in amplifying AIDS-related messages. Chinese social media platforms such as Weibo use trending topics and recommendations to increase exposure to health campaigns. This study examined the content of social media platforms during AIDS Week and identified both advancements and constraints in China's AIDS Week health campaign.

Social Media and AIDS Health Campaign in China

Social media has emerged as a primary tool for disseminating health information due to its accessibility and real-time interactivity, surpassing traditional media channels (Moorhead et al., 2013; Smailhodzic et al., 2016). It allows users to discuss health-related issues and seek assistance (Fergie et al., 2016; Jacobs et al., 2017; Tennant et al., 2015). Enhancing the content and penetration of HIV/AIDS campaigns within social media can have significant effects on HIV knowledge and reduce HIV-related discrimination (Li et al., 2009). This can influence individuals' attitudes towards HIV testing (Jones et al., 2019) or their intentions to receive the HPV vaccine (Yoo et al., 2018). Taggart and colleagues (2015) highlight the role of social media in facilitating discussions about HIV/AIDS, including access to information, enhanced communication abilities, anonymity, social and emotional support, establishing virtual communities, and geographical reach This is particularly crucial for vulnerable groups seeking information, advice, and support (Ayers et al., 2024; Cao et al., 2017). Non-governmental organizations (NGOs) harness social media platforms as vital resources and channels to influence public policy, drive public education initiatives, and provide essential social support (Fu & Zhang, 2019).

In addition, social media presents healthcare providers with opportunities for efficient and accessible public health monitoring and the sharing of resources and information (Aiello et al., 2020; Moorhead et al., 2013). Throughout the COVID-19 pandemic, social media platforms have been utilized to monitor instances of age discrimination (Jimenez-Sotomayor et al., 2020), stigmatization (Budhwani & Sun, 2020), and to provide insights into the virus's origins and public panic (Abd-Alrazaq et al., 2020; Li et al., 2020). Social media's timely nature enables

sharing resources and the creation of mutual aid networks among medical professionals (Chan et al., 2020).

Current research indicates that Twitter can serve as a proxy for public behaviors related to HIV infection, with the volume of HIV-related tweets positively correlated with HIV infection rates (Stevens et al., 2020). Therefore, as a multifaceted platform for discourse, we believe that social media data can provide valuable insights into current user behaviors and attitudes. However, there is currently a lack of research (Zhang, 2005) in China specifically focusing on organized HIV health campaigns. A study has focused on China as the cultural context, but they primarily concentrate on community interventions (Xiaoming et al., 2000), without addressing nationwide health campaigns.

The AIDS Week health campaign, as defined by Chinese authorities, represents the largest and most comprehensive HIV/AIDS health movement in China. Moreover, online dissemination has been included as a key component of the annual policy, with agencies at all levels required to use the internet to communicate the guidelines for AIDS Week, which presents an opportunity for mapping China's HIV/AIDS promotion strategies, public awareness, and risk factors.

Present study

This study aimed to analyze the data from AIDS Weeks between 2018 and 2022 by combining Latent Dirichlet Allocation (LDA) and Critical Discourse Analysis (CDA). LDA provided a comprehensive overview, offering quantified contextual information as a foundation for the subsequent CDA discussion. Specifically, we investigated the dissemination of HIV/AIDS-related information on social media, the distribution of themes, and people's reactions. CDA further examined the social structures, cultural contexts, and power dynamics underlying

discourse. By analyzing user texts, we aimed to identify risk factors within the existing framework, enabling public health organizations to better understand how the public utilizes social media. This understanding informed the development of strategies for HIV/AIDS health campaigns.

Methods

Data

Weibo, a prominent social media platform in China, attracts millions of users daily, making it a significant space for sharing information and opinions. As of September 2020, it boasted over 200 million active users daily and 500 million active users monthly. In this study, we used the keyword AIDS, including possible variations of the terms and their synonym, to retrieve posts during World AIDS Weeks. Using Weibo Spider (Dataabc, 2023), we conducted two crawls to collect original Weibo posts over five years to ensure the data's comprehensiveness, conciseness, and accuracy. After combining the data from these crawls and removing duplicates using Pandas 1.5.2 (*Pandas - Python Data Analysis Library*, n.d.), we initially obtained 63,612 posts from November 29 to December 5, spanning 2018 to 2022.

Before the post-analysis, duplicate values and punctuation marks were removed, and stop words were extracted from the dataset using the jieba package in R (Version 4.0.3). Words with a length greater than two characters and a frequency greater than five were selected. To ensure that the chosen words significantly contributed to the topic, words that appeared less than five times in the corpus were removed. Stop words are removed because they are commonly used words that do not carry distinct semantic meanings (e.g., auxiliary verbs, conjunctions, and articles). These terms appear in almost every document and would form a topic independently

due to frequent co-occurrence with other words (Ikonomakis et al., 2005). The cleaned post data were stored in a document-term matrix. Columns consisted of terms (i.e., keywords) in a post (according to word segmentation). Rows consisted of the document numbers (i.e., each post on Weibo). The resulting table captured the occurrence frequency of a given term in each document.

Meanwhile, the preprocessed data had to be transformed into a vector format for further calculation steps because LDA expects a document-term matrix and a word dictionary. From these two representations, we built a corpus in a "bag-of-words" format (i.e., a collection of words without information about word order or grammar). Finally, 32,876 posts were included in the analysis. The official policies of the AIDS Office for each year were also included in the study as essential references for distinguishing year differences and understanding the context.

Latent Dirichlet Allocation

LDA is a probabilistic model for measuring health content on social platforms, including Twitter (Paul & Dredze, 2014), Weibo (Xie et al., 2021) and Instagram (Muralidhara & Paul, 2018). It has been widely applied in post-data mining content processing (Chen et al., 2016; Muralidhara & Paul, 2018; Pruss et al., 2019). We used LDA topic models to extract topics from the Weibo posts, allowing us to interpret how topics generated the posts using the Bayesian network diagram (see Figure 1). LDA extracts the variable φ, which represents a multinomial distribution of words within a topic, while the other latent variable θ constitutes a multinomial distribution of topics in a document. α and β are two concentration parameters: α represents prior knowledge regarding the distribution of topics in a document, and β represents prior knowledge regarding the distribution of words in a topic. LDA assumes that each document d of a set of documents D contains one or more topics z, which is again defined by a probability distribution of single words w, the only observed variable in the model. A higher value of α indicates a more smoothed

distribution of topics over the document, whereas a lower value, notably lower than zero, indicates a higher concentration of topics. φ, θ, and z are latent and unobserved variables generated when LDA runs (Griffiths & Steyvers, 2004).

We used genism to create an LDA model and then ran and trained it using our document-term matrix. Models were trained using 10-fold cross-validation, and the number of topics (K value) was selected according to log-likelihood values. Based on the results presented in Figure 2, it can be observed that the log-likelihood values kept increasing as the number of topics increased. To determine the optimal number of topics, we set the final number at the turning point where the rate of increase was less than 0.01. The number of topics strongly influences topic-word distributions in terms of topic granularity. Due to the limited word count, a smaller number of topics leads to larger topics (i.e., containing more words), whereas a higher number leads to smaller topics (i.e., containing fewer words). Effectively, this process involves a trade-off between minimal information loss through high granularity and generating distinct and meaningful topics. To achieve the most reliable results, we tested and compared different parameter combinations (e.g., number of passes, alpha, number of topics, beta) and then manually interpreted the semantic meaning of the topics. In our case, the optimal number of topics was 40.

Sentiment analysis

To further map each topic's contribution, we conducted a sentiment analysis. Sentiment analysis can yield the sentiment value of words and sentences through weighted calculation from a given sentiment dictionary (Chen et al., 2020). In this study, we used the HowNet sentiment dictionary from the China National Knowledge Infrastructure (CNKI), including positive emotion words, negative emotion words, negative adverbs, common stop words, adverbs of degree, etc. The

emotional scores of each emotional word and the negative word and adverb of degree that modifies the emotional word can be obtained by referred algorithms. For a sentence with several emotional words, the total emotional score can be obtained by summing the emotional scores of each emotional word (Xie et al., 2012; Yang & Wang, 2019; Zhao et al., 2010).

Critical Discourse Analysis

Shi and colleagues emphasized the need for researchers to provide detailed content analysis of campaign messages (Shi et al., 2018). While topic modeling offers a quick and accurate way to identify user-generated message themes, it may fail to capture nuances, such as power relations embedded within the platform (Rouhana, 2023). To address this limitation, CDA serves as a complementary approach (Guetterman et al., 2018). CDA places messages within broader social structures and material contexts, focusing on language and power relations (Fairclough, 2005; Meyer & Wodak, 2015).

This study employed a sequential explanatory mixed-methods design (Castro et al., 2010) to combine CDA with topic modeling. This integration enhances validity and reliability and adds reflexivity to identify discourses based on topic relations and explore linkages between discourses and context (Aranda et al., 2021; Jacobs & Tschötschel, 2019; Törnberg & Törnberg, 2016). Topic modeling offers a comprehensive, replicable, and systematic quantification method, avoiding redundancy and overly purposive sampling. This provides a superior way to study hegemony, which involves searching for patterns, routines, and logic that shape the normalized grammar of daily life (Jacobs & Tschötschel, 2019).

The combined approach of topic modeling and CDA has been successfully applied across various fields in media research (Benites-Lazaro et al., 2018; Rouhana, 2023; Törnberg & Törnberg, 2016). Mapping World AIDS Week involves inferring mechanisms from results (user

texts) to understand why and how such discourses are constructed. China's cultural traditions, social systems, and AIDS Week promotion mechanisms play potentially significant roles in this process (Ho et al., 2018). Therefore, this method is well-suited for our study.

Results

Topic modeling and sentiment analysis

The number of topics for the LDA model was determined based on the log-likelihood function, with the highest value observed at 40 topics (see Figure 2). Consequently, we set the number of topics to 40 and utilized them to code the corpus. Initially, we conducted open coding to tag and conceptualize interview content, resulting in 28 initial coding labels. These labels were further refined through merging, reorganization, and consolidation of similar types, yielding 21 topics. After screening, these labels were classified into six thematic clusters: Virus Status, Positive Feedback, Specific Groups, Specific Topics, Promotion, and Response Methods (Table 1).

After excluding meaningless dummy words (e.g., interrogative intonation, quantifiers) from each topic, we identified ten keywords with the highest frequency. In Tables 2–7, we present the topics, the abstracts of each theme, the English translations of the top 10 meaningful keywords, and an example post for each topic. According to the underlying premise of the LDA model, every post comprises a blend of topics that vary in probabilities. Therefore, we selected an example post falling under a specific topic with one of the highest probabilities.

The distribution of primary and secondary themes varies annually due to changing social contexts and slogans. To assess this variability, a chi-square test was conducted each year, revealing a significant difference in emotions across different themes ($p < 0.001$, see Table 8).

Positive emotions predominated over negative emotions within each theme across most years (Figure 3). However, emotions were highly polarized across different topics. Positive Feedback, Promotion, Response Method, and Specific Groups showed consistently more positive emotions than negative ones. In contrast, Virus Status was dominated by negative emotions, and Specific Topics fluctuated over time. As Principal Component Analysis (PCA) is an unsupervised machine learning technique commonly used for dimensionality reduction, it was employed to obtain a participation index, weighting shares, comments, and likes. Posts with no audience participation were excluded, and the top 10% of posts each year were selected based on the PCA index. A heatmap was generated to display the frequency of posts for each secondary theme (Figure 4). The darker the color, the more posts with widespread user participation appeared within a given topic, highlighting the outcomes that netizens focused on under different promotional strategies each year. Reflecting current social issues, Gene Editing emerged as a time-specific topic, generating discussions in 2019 and accounting for 17% of highly interactive posts. However, in subsequent years, its participation index dropped to zero. Topics such as Anti-drug, Campus Promotion, Celebrity Promotion, Community Promotion, and Emergency Measures consistently attracted high levels of discussion. Some of this engagement was driven by official media outlets, including Emergency Measures in 2021 and Celebrity Promotion in 2019, both led by CCTV News, CCTV.com, and Xinhua News. Discussions on the epidemic in 2022 were primarily fueled by entertainment media, such as *The Paper* (澎湃新闻). In contrast, there was no single dominant institution driving high participation in the anti-drug topic, with local anti-drug agencies, campus media, and local news outlets collectively contributing to its high engagement.

A thematic map from 2018 to 2022 is presented in Figure 5, illustrating the evolving landscape of themes over the five years. Overall, during AIDS Week, discussions took on a more practical focus, with increasing attention to Virus Status and Response Methods, while discussions on Positive Feedback declined. Additionally, Figure 6 illustrates the proportional distribution of 21 topics across various themes throughout the study period. Within Virus Status, the proportion of discussions on Severity steadily increased, while conversations about transmission methods dropped significantly—from 78.21% in 2018 to just 26.88% in 2022. Similarly, the primary setting for Promotion shifted from campuses (2018 = 51.64%, 2022 = 23.71%) to communities (2018 = 17.67%, 2022 = 32.55%), showing a gradual transition over the years.

Critical Discourse Analysis

AIDS Week Promotion Strategies

The promotion strategy for China AIDS Week combines threat (Virus Status) and efficacy (Response Methods) to disseminate knowledge and promote positive behaviors, consistent with the Extended Parallel Process Model (EPPM, Afenigus et al., 2021; Jahangiry et al., 2020). Ideally, individuals are more likely to take action to control the danger when they perceive the severity and susceptibility to be high (high threat appraisal) and believe they are competent to take mitigating action (high efficacy appraisal, Witte, 1994). In posts, a significant number of adverbs such as “unexpectedly,” “extremely,” and “surprisingly” are used to emphasize the severity of AIDS. Discussions about the seriousness of the Virus Status theme have steadily risen since 2019, reaching 73.12% by 2022 (Figure 5). However, excessive risk perception and a lack of response methods can lead individuals to perceive their ability to control the risk as low,

further inducing fear control, including denial, psychological reactance, and defensive avoidance. Notably, in 2021, the hashtag #AIDS accounts for 70% of infectious disease cases and deaths#, and in 2022, #Being infected with HIV does not equate to having AIDS# sparked extensive discussions. The former topic is associated with panic, while the latter reflects increased skepticism toward expert advice during the COVID-19 pandemic.

However, response methods rarely provide the attention to detail that most people need regarding preventive measures, focusing mainly on discussions of emergency measures and treatment methods (see Table 2). Many posts simplify preventive measures, equating them with preventing sexual transmission. This further deepens the stigma of AIDS, portraying it as a metaphor for "lack of morality" and "one-night stands."

Celebrity endorsements, with AIDS prevention ambassadors forming star-studded teams, have become significant forces in disseminating basic AIDS knowledge and fostering the right attitudes to the public. This represents the emergence of modern heroism, where these heroes' actions are orchestrated by both governmental and societal organizations, targeting a modern disease that requires new social and political engagement and management techniques. They construct collective images focusing on disease awareness and human rights advocacy, presenting an avatar of China's official stance. Their public celebrity status reflect contemporary expressions of activism and identity management (Hood, 2010; Jones, 1998). Social media is crucial in promoting and discussing these new societal figures (Hood, 2010). However, this process may lead to conflicts between body, self, and person, resulting in contradictory or ambiguous constructions and undermining trust in the government (Jones, 1998).

Additionally, popular science has not effectively utilized the interactive features of social media. Topics that are sensational and novel triggered broader discussions. If the government

and official sources manage related topics and debunk rumors, it will positively affect the dissemination of information. For instance, in 2018, a gene editing incident sparked intense discussions during HIV Week, but subsequent years saw limited mention of it. In 2019, malicious rumors about HIV transmission emerged online, while in 2020, various provinces debunked HIV-related rumors, such as claims about marriage or fertility restrictions, leading to increased discussions. In 2021, widespread discussion ensued after an older man transmitted HIV to his wife through extramarital sexual activity.

It can be challenging to induce selective exposure to media when personal interests are not directly related to the information (Bolsen & Leeper, 2013; Skovsgaard et al., 2016). Feasible measures include increasing personal relevance, enhancing connections to specific groups, or altering public values (Knobloch-Westerwick, 2014a, 2014b). For instance, in the Response Methods section, due to extensive news coverage on CAR-T cell therapy for HIV in 2018, the topic of treatment methods had a higher frequency of occurrence in 2018 and 2019. This topic sparked discussions due to numerous reports emphasizing the involvement of "Chinese scientists," leading to posts expressing nationalistic sentiments. Additionally, the proportion of discussions on emergency measures significantly increased in 2021, likely due to promotion by CCTV News on Weibo (Figure 4). Moreover, enhancing the credibility of information sources can further influence users' viewpoints and behaviors (Knobloch-Westerwick et al., 2013).

Efficiency or Effectiveness: The Dilemma of Top-Down Systems

The AIDS Week strategy utilizes institutional characteristics to mobilize the government and promote HIV/AIDS prevention and control through top-down communication. This is accomplished by establishing the government's responsibility, clarifying the responsibilities of various departments, and driving the efforts of the entire society (He, 2021; Sheng & Cao, 2008;

Xu et al., 2021). The Promotion theme clearly shows that different agents have implemented the promotion (Table 4).

The posts reveal that students and community volunteers are the primary executors of promotional work. Acting as peers to both the youth and elderly groups at high risk of HIV/AIDS, they conduct small-scale HIV/AIDS promotion activities on campuses or within communities. However, given the sensitivity surrounding mass gatherings in China, particularly in the ambiguous realm concerning HIV/AIDS, sexuality, and human rights. These executors often seek endorsement from official organizations to legitimize their actions, albeit constrained by the official agenda.

NGOs serve as intermediaries, facilitating top-to-bottom publicity. For example, to reach college students, the China Family Planning Association has partnered with NGOs such as the China Youth Network (CYN), a leading NGO in China focusing on sexual and reproductive health, to conduct nationwide campaigns promoting youth health programs. Schools receive funding from CYN and implement offline promotions. Within campuses, top-down control is also present, with activities often requiring guidance from the Party's promotion department. Typically, posts emphasize the event's importance by highlighting school leaders' participation.

The benefit of employing top-down communication in the policy environment lies in its efficiency in implementing directives from higher levels of authority and enabling feedback on social media platforms. However, while this approach visualizes the outcomes of policy implementation, focusing solely on evaluating reports rather than systematically assessing effects on awareness and behavior can result in superficial health campaigns. This is often compounded by bureaucratic hurdles, which hinder effective communication and implementation.

Weibo has transformed from an opinion platform to a tool for reporting policy implementation. Formalistic assessment strategies have alienated social media interaction, resulting in repetitive and monotonous actions taken by bloggers (Fu & Zhang, 2019). This detachment is particularly evident in promotional themes, where user participation is limited, and bloggers focus more on conforming to superiors rather than engaging with their audience. There is a lack of communication between users. Isolated voices accounted for most within five years. Similar problems exist in Virus Status (Table 5) and Positive Feedback (Table 7), where science popularization and advice dominate using a preaching approach to change users' awareness without considering their feedback.

Localization of AIDS Week in Chinese Context

The annual slogan for AIDS in China is adjusted according to the differences in global themes and current social backgrounds. The Positive Feedback changes each year based on different advocacy strategies. For instance, in 2021 and 2022, the emphasis on equal health correlated with a higher proportion of respect-related topics.

The topic of the Pandemic gradually gained prominence due to the COVID-19 pandemic, peaking at 59.09% in 2022 (see Figure 5). This shift was accompanied by changes in the distribution of promotional themes (see Figure 6). The pandemic policy reduced offline campus activities, while relaxed regulations on volunteer actions in communities resulted in a slight increase in community-related topics. Despite efforts to localize AIDS-related slogans, the execution remains unchanged, with minimal impact on social media guidance to the public. Through CDA, it's evident that changes in post themes over time may be superficial, often limited to the inclusion of slogans in posts. This observation underscores the need for a more substantial shift in approach.

Moreover, localization challenges are compounded by China's uneven development context, where traditional values and limited public knowledge hinder effective execution. Chief among these challenges is the influence of traditional values that stigmatize sexuality, contributing to societal barriers in addressing HIV/AIDS. In community promotion efforts, there's a delicate balance between ensuring residents' acceptance and providing comprehensive education on HIV transmission (see Table 4 Topic 5). Some promotion choose an ambiguous approach, incorporating AIDS awareness within larger public issues like anti-cultism and constitutional maintenance. This strategy risks obscuring vital information about HIV transmission routes, increasing uncertainty of knowledge, perpetuating misconceptions, and fueling stigma against those affected by HIV/AIDS (Chen et al., 2007). Paradoxically, sexual transmission has emerged as the predominant route of HIV transmission (Cui et al., 2017; Xu et al., 2021

The elderly in China's traditional values are considered should not express their sexual needs. Thus, the topic of older people is rarely concerned with the medical conditions but instead blames them for how they contracted AIDS (Table 6 Topic 1). Similarly, while there may be positive portrayals of homosexuality in some posts, pervasive stereotypes persist, such as associating homosexuality with promiscuity and one-night stands (Table 6 Topic 2). Official media channels often fail to provide a balanced perspective, focusing solely on the patient's narrative without considering the challenges faced by marginalized communities. This attitude reflects an acceptance of HIV/AIDS while simultaneously refusing to acknowledge the legitimate sexual needs of groups such as the elderly and the LGBTQ+ community (Sun & Yang, 2023). The absence of authoritative advocacy further silences marginalized voices, deepening their stigma and reinforcing negative stereotypes. These intersecting factors normalize the

stigmatization of marginalized groups, creating a complex web of prejudice and intersectional discrimination.

Discussion

Our recent research reveals that user engagement on social media platforms appears independent of emotional content. This deviation may stem from limited data interactions (Chung, 2016) and the predominantly one-way dissemination of information from organizations to individuals (Ramanadhan et al., 2013), leading to skewed data distribution. However, this is an unfavorable trend because discussions about HPV guidance and personal experiences correlate positively with vaccine willingness (Jiang et al., 2023). This trend is particularly evident in discussions surrounding Virus Status and Positive Feedback, where the dissemination of scientific information and advice dominates, often without adequate consideration for user feedback. The underlying issue lies in the prescriptive approach adopted, which aims to alter users' awareness without fostering meaningful dialogue or incorporating their perspectives.

Within six themes and 21 topics, the promotion has yielded insights aligned with China's AIDs week guidelines. NGOs have been vital in AIDS prevention and control (Li et al., 2010). Combining CDA, we observed many campus and community organizations report activity logs during AIDS Week. Activities such as peer education programs, specialized lectures on campuses (Liang et al., 2022), reading materials, radio broadcasts, workshops, home visits, and individual counseling in communities (Xiaoming et al., 2000) have proven effective. However, disparities in regional development levels, school types (vocational, regular, elite, Kong et al., 2023; Wang et al., 2021), and community development levels (Chen et al., 2005) contribute to unstable AIDS stigma and willingness to adopt health behaviors.

Overall, the Promotion themes reflect China's top-down policy structure, demonstrating high efficiency, responsiveness, and contributions at all levels to AIDS prevention and control. However, Weibo has not served as an interactive platform but rather as a platform for reporting work (Zhao et al., 2023). During health campaigns, the parallel use of media threats and efficacy in promotion affects perceived risks, influencing behavioral intentions (Jemmott et al., 2023). While this approach is effective, the lack of solutions in media messages may lead to inefficacy and audience resistance, hindering the promotion of healthy behaviors. Local Chinese studies suggest that short videos may offer highly readable intervention methods (Liu et al., 2023) to address this issue.

Moreover, the perpetuation of sexual repression in Weibo texts further contributes to the stigmatization of AIDS and AIDS patients (Zhou, 2007), exacerbating the challenges faced by specific groups in China. For instance, homosexuals continue to lack social recognition and are marginalized in official government discourse (Sun & Yang, 2023). NGOs providing health services for homosexuals are unable to defy government opinions, or express non-mainstream views (Cao & Guo, 2016; Fu & Zhang, 2019). In this hostile environment, the absence of regulation on Weibo exacerbates the issue, allowing the dissemination of hate speech and perpetuating the stigmatization of the elderly and homosexuals as AIDS patients.

Therefore, we propose several strategies. Firstly, providing the public with accessible and understandable coping mechanisms is crucial. Media can balance threat and efficacy by increasing the selectivity of topic exposure through topical discussions. Additionally, by enhancing personal relevance, connecting with specific groups, and improving the credibility of information sources (Knobloch-Westerwick, 2014b), individuals can be guided to develop accurate perceptions of AIDS. Secondly, social media platforms should further consider the

relationship between the lack of interaction and the regulation of hate speech, transforming the platform into a forum for open communication rather than an isolated chamber for expressing the majority views. Thirdly, despite challenges posed by cultural environments and China's ideological landscape, efforts to combat stigma, misinformation, and panic require official media and opinion leaders to correct public opinion. Fourthly, AIDS Weeks should prioritize evidence-based and professional opinions. Addressing the shortage of healthcare professionals can also help alleviate stigma (Ma et al., 2015). Lastly, attention should be paid to the intersecting nature of stigma. Overlapping stigmatized identities among older people, homosexuals, AIDS patients, and women may contribute to biopsychosocial issues (Friedman et al., 2022; Jackson-Best & Edwards, 2018; Turan et al., 2019), fostering a vicious cycle of medical mistrust and HIV transmission (Lutete et al., 2022).

Limitations and Suggestions for Future Research

This article acknowledges several limitations that could be addressed in future research. Firstly, despite examining texts from various sources (individuals, NGOs, media, and government agencies), we did not conduct a detailed role analysis due to China's complex media environment. Future studies could explore the role distinctions within social networks in forwarding behaviors to discuss the objectives and dissemination characteristics. Secondly, using Weibo as a data source has limitations in representing real public opinion, as it may not capture diverse demographics such as age, social status, and economic environment (Campos-Castillo, 2014; Hargittai, 2018). Therefore, future research may benefit from additional data sources and methodologies to capture a more comprehensive range of public opinions.

Conclusions

The study mapped public responses during AIDS Week from 2018 to 2022 through the analysis of text. Using LDA, six themes and 21 topics were summarized. Findings suggest minimal text interaction, with no correlation between emotion and interaction. CDA further explored the context and social structures of discourse under each theme. Results demonstrate a parallel threat and efficacy trend in AIDS Week promotion in China. However, the lack of actionable information may lead to reduced behavioral intentions. While most promotion focuses on educating the public, discussions on specific topics are essential for engaging a broader audience. The top-down implementation approach ensures efficient execution at all levels but also results in formalism during AIDS Week, characterized by numerous ceremonial aspects that obscure specific execution outcomes. Text themes vary annually based on slogans and social contexts, requiring localization for effective implementation and overcoming cultural barriers detrimental to health promotion. Stigmatization of specific groups and intersectional issues warrant attention. We recommended that AIDS Week not be the sole health campaign focusing on AIDS awareness throughout the year. Social media platforms should be used to encourage greater public participation and interaction rather than serving solely as channels for reporting to higher authorities. Increasing public awareness of AIDS outside of AIDS Week is vital for mitigating stigma and rumor risks associated with the disease.

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Ethical approvals

Approval was obtained from Tsinghua University Institutional Review Board (Project No: 20190083). All data were anonymized under a waiver of consent as per data sharing and ethical approval agreements.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, KT, upon reasonable request.

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Table

		Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
		8581	1756	3963	5653	1353	2648	4964	1007	2855	5142	1423	3502	2871	834	1885
Response Methods	Anti-drug	552 (9.0)	71 (6.3)	156 (5.8)	323 (8.5)	59 (7.4)	120 (7.1)	355 (10.4)	53 (8.5)	97 (6.1)	366 (11.3)	61 (5.8)	135 (5.1)	358 (16.8)	82 (14.0)	162 (11.8)
	Treatment Methods	472 (7.7)	38 (3.3)	52 (1.9)	188 (4.9)	28 (3.5)	75 (4.4)	59 (1.7)	8 (1.3)	30 (1.9)	54 (1.7)	18 (1.7)	33 (1.2)	79 (3.7)	14 (2.4)	28 (2.0)
	Emergency Measures	114 (1.9)	57 (5.0)	231 (8.6)	91 (2.4)	39 (4.9)	113 (6.7)	64 (1.9)	22 (3.5)	81 (5.1)	176 (5.4)	71 (6.8)	506 (19.1)	72 (3.4)	38 (6.5)	98 (7.1)
Specific Topics	Rumors	207 (3.4)	65 (5.7)	158 (5.9)	183 (4.8)	79 (9.9)	116 (6.8)	151 (4.4)	32 (5.2)	71 (4.5)	89 (2.7)	41 (3.9)	55 (2.1)	67 (3.1)	20 (3.4)	41 (3.0)
	Gene Editing	1017 (16.7)	193 (17.0)	373 (13.9)	28 (0.7)	9 (1.1)	15 (0.9)	54 (1.6)	12 (1.9)	42 (2.7)	12 (0.4)	6 (0.6)	13 (0.5)	13 (0.6)	5 (0.9)	7 (0.5)
	Epidemic	45 (0.7)	9 (0.8)	44 (1.6)	66 (1.7)	15 (1.9)	55 (3.2)	42 (1.2)	7 (1.1)	24 (1.5)	135 (4.2)	47 (4.5)	244 (9.2)	85 (4.0)	31 (5.3)	183 (13.3)
	Extramarital Sex	83 (1.4)	22 (1.9)	170 (6.3)	55 (1.4)	22 (2.8)	58 (3.4)	30 (0.9)	10 (1.6)	57 (3.6)	162 (5.0)	219 (21.0)	375 (14.1)	17 (0.8)	7 (1.2)	30 (2.2)
Promotion	Prison Promotion	232 (3.8)	53 (4.7)	99 (3.7)	179 (4.7)	29 (3.6)	81 (4.8)	173 (5.1)	44 (7.1)	70 (4.4)	142 (4.4)	29 (2.8)	40 (1.5)	122 (5.7)	27 (4.6)	58 (4.2)
	Government Promotion	168 (2.8)	37 (3.3)	36 (1.3)	175 (4.6)	39 (4.9)	41 (2.4)	202 (5.9)	43 (6.9)	59 (3.7)	170 (5.2)	25 (2.4)	35 (1.3)	88 (4.1)	26 (4.4)	35 (2.5)
	Medical Promotion	131 (2.1)	35 (3.1)	63 (2.3)	89 (2.3)	30 (3.8)	44 (2.6)	86 (2.5)	24 (3.9)	62 (3.9)	166 (5.1)	66 (6.3)	102 (3.8)	82 (3.9)	24 (4.1)	39 (2.8)
	Campus Promotion	1357 (22.2)	174 (15.3)	284 (10.5)	830 (21.7)	109 (13.6)	155 (9.1)	677 (19.9)	98 (15.8)	93 (5.9)	486 (15.0)	79 (7.6)	200 (7.5)	215 (10.1)	45 (7.7)	43 (3.1)
	Community Promotion	449 (7.4)	87 (7.7)	85 (3.2)	378 (9.9)	59 (7.4)	87 (5.1)	518 (15.2)	100 (16.1)	207 (13.1)	212 (6.5)	40 (3.8)	69 (2.6)	327 (15.4)	52 (8.9)	37 (2.7)
	Celebrity Promotion	170 (2.8)	22 (1.9)	33 (1.2)	217 (5.7)	29 (3.6)	53 (3.1)	163 (4.8)	9 (1.5)	117 (7.4)	116 (3.6)	27 (2.6)	189 (7.1)	34 (1.6)	5 (0.9)	19 (1.4)
Themes	Topic	2018			2019			2020			2021			2022		
		Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
Virus Status	Sexual Transmission	163 (2.7)	65 (5.7)	283 (10.5)	97 (2.5)	50 (6.3)	122 (7.2)	61 (1.8)	27 (4.4)	97 (6.1)	84 (2.6)	32 (3.1)	73 (2.7)	58 (2.7)	20 (3.4)	42 (3.1)
	Severity	77 (1.3)	27 (2.4)	98 (3.6)	55 (1.4)	24 (3.0)	83 (4.9)	54 (1.6)	31 (5.0)	121 (7.6)	149 (4.6)	74 (7.1)	215 (8.1)	161 (7.6)	104 (17.8)	366 (26.6)
	Other Transmission Routes	83 (1.4)	13 (1.1)	118 (4.4)	77 (2.0)	9 (1.1)	100 (5.9)	38 (1.1)	11 (1.8)	78 (4.9)	95 (2.9)	37 (3.5)	100 (3.8)	36 (1.7)	18 (3.1)	58 (4.2)
Specific Groups	Elderly People	88 (1.4)	43 (3.8)	113 (4.2)	211 (5.5)	67 (8.4)	125 (7.4)	147 (4.3)	22 (3.5)	87 (5.5)	204 (6.3)	112 (10.7)	132 (5.0)	84 (3.9)	19 (3.2)	17 (1.2)

	Homosexuality	111 (1.8)	34 (3.0)	64 (2.4)	104 (2.7)	34 (4.3)	57 (3.4)	102 (3.0)	11 (1.8)	56 (3.5)	83 (2.6)	19 (1.8)	56 (2.1)	47 (2.2)	14 (2.4)	40 (2.9)
Positive Feedback	Respect	237 (3.9)	32 (2.8)	70 (2.6)	226 (5.9)	28 (3.5)	46 (2.7)	176 (5.2)	19 (3.1)	51 (3.2)	177 (5.5)	23 (2.2)	38 (1.4)	92 (4.3)	13 (2.2)	27 (2.0)
	De-stigmatization	148 (2.4)	22 (1.9)	119 (4.4)	98 (2.6)	22 (2.8)	120 (7.1)	71 (2.1)	19 (3.1)	53 (3.4)	41 (1.3)	3 (0.3)	20 (0.8)	32 (1.5)	10 (1.7)	30 (2.2)
	Acceptance	196 (3.2)	36 (3.2)	43 (1.6)	151 (4.0)	19 (2.4)	30 (1.8)	184 (5.4)	18 (2.9)	29 (1.8)	120 (3.7)	15 (1.4)	25 (0.9)	58 (2.7)	11 (1.9)	14 (1.0)

Table1 Emotional frequency distribution of 21 topics from 2018 to 2022

Table 2 Response Methods

abstract	Response methods refer to how individuals can prevent HIV (anti-drug campaign), and how to treat suspected or confirmed infections (treatment methods). They have guiding significance for the general public.

Topic:	Examples
Topic 1: Anti-drug	
Keywords	Keywords: anti-drug, addiction prevention, cherish life, public security, peer support, safety, anti-HIV, public security bureau, detachment, social worker
Example	On World AIDS Day, in order to thoroughly implement the important instructions of General Secretary Xi Jinping on drug control and AIDS prevention work, effectively curb drug-related crimes and the spread of HIV infections, and enhance people's awareness and ability to prevent drug abuse and AIDS, the Anti-Drug Brigade of Shouyang County Public Security Bureau and the County Community Drug (Rehabilitation) Service Center organized various forms of anti-drug and AIDS prevention propaganda activities around the theme of "life first, end AIDS, health equality".
Topic 2: Treatment methods	
Keywords	professor, university, invention, Yunnan, patent, terminal illness, approval, invention patent, fatal, Immunology
Example	The clinical trial of HIV/AIDS treatment approved and recognized by the country was conducted by Professor Zhang Tongcun's team. The treatment had amazing results for two HIV patients: one patient's HIV index dropped rapidly after treatment for several months (beyond imagination), and another patient did not have any HIV in their body after treatment for several months (essentially cured). Zhang's team is currently recruiting volunteers carrying HIV to participate in the clinical trial. CAR-T immune cell therapy, which is currently undergoing human clinical trials, may completely cure AIDS when combined with anti-HIV drugs.
Topic 3: Emergency measures	
Keywords	hours, self-help, accidental, violation, judgment, police, testing paper, golden time, emergency
Example	The effective time for drug blocking medication after sexual exposure is within 24 hours. Four years ago, when Wang Qiang was chatting with an HIV-infected person, the person told him that after engaging in high-risk behavior, taking blocking drugs could prevent infection. He did not expect that a casual conversation would give him a chance to "regret" three years later.

Table 3 Specific topics

abstract	Specific topics are independent topics that are often discussed frequently in specific years due to social news.
Topic	Examples
Topic 1: Rumors	
Keywords	Chengdu, common sense, rumor, genital warts, carriers, Shijiazhuang, fear of AIDS, Sina, debunking
Example	[Police debunked the rumor: Someone on Chunxi Road in Chengdu is using a needle to transmit AIDS? The spreader has been punished.] #Weibo debunking# #Clean the internet# #Police debunking# #AIDS# #Understand AIDS# December 1 is World AIDS Day, which aims to raise public awareness of the spread of AIDS caused by the HIV virus globally. Unexpectedly, rumors about AIDS have also emerged. Two days ago, Chengdu police found during an online inspection that Weibo netizen claimed that "someone on Chunxi Road is using a needle with a virus to stab you? It feels like you just scratched yourself with a sharp object by accident." He also said that he dared not go out. The police reviewed and found that this rumor was circulating in QQ space a few years ago, and at that time, the "AIDS needle" was installed on Internet cafe seats. Later, the "AIDS needle" rumor spread throughout the country. In fact, the HIV virus is very fragile and cannot survive in the air, water, or food. Once it leaves the human environment, the AIDS virus will quickly lose its ability to spread.
Topic 2: Gene editing	
Keywords	genes, editing, babies, first case, He Jiankui, China Association for Science and Technology, pros and cons, Ministry of Science and Technology, genetically modified, ethical and moral principles
Example	What can the law do about He Jiankui? "Gene-edited babies" violate ethical norms, but there are no specific criminal charges in criminal law. This exposes loopholes in our country's genetic legislation. He Jiankui, an associate professor in the biology department at the Southern University of Science and Technology, announced that a pair of gene-edited babies named Lulu and Nana were born healthy in China in November. The news quickly sparked strong attention and controversy in the academic community both domestically and internationally. However, leaders of the National Health Commission, the Ministry of Science and Technology, and the China Association for Science and Technology stated in separate media interviews about the gene-edited babies incident for immunizing AIDS that it seriously violated national laws, regulations, and ethical norms, and relevant departments and localities are investigating it in accordance with the law and will firmly punish illegal acts.
Topic 3: Epidemic	
Keywords	Mutation, Omicron, Strain, Vaccination, South Africa, Influenza, Variant, Delta
Example	[Interpretation | Why does "Omicron" cause global alertness?] "The emergence of highly mutated Omicron variant highlights how dangerous and unstable our situation is." On December 13, Tedros Adhanom Ghebreyesus, the Director-General of the World Health Organization (WHO), stated during the opening ceremony of the special session of the World Health Assembly. Tedros also said, "We do not yet know whether Omicron is associated with more transmission, more severe disease, greater risk of reinfection, or higher risk of vaccine escape, WHO and scientists globally are working to answer these questions as a matter of urgency." Although there are still many unknowns about Omicron, it has already caused global alertness. Within a few weeks of its first appearance in the southern part of Africa earlier this month, the variant has spread to more than ten countries and regions in Africa, Europe, Asia, North America, and Oceania.
Topic 4: Extramarital Sex	
Keywords	Elderly, Extramarital Sex, Wife, Transmission, Condom, Self-restraint, Prostitution, Sexual Activities, Partner, Infidelity
Example	#An octogenarian transmitted AIDS to his wife due to extramarital sex# The octogenarian had contracted AIDS through years of prostitution and transmitted it to his wife. Let me correct the title. What is extramarital sex? Why can't you understand it? Can't the wording be more precise? Should the octogenarian get a pass? Wrong is wrong, regardless of whether he is in his eighties or one hundred. This incident serves as a warning to elderly people. In recent years, AIDS patients have been aging, so we should be more vigilant. The topic is so ambiguous, hiding the truth.

Table 4 Promotion

abstract	Promotion is a big part of AIDS Week discussions, including previews of promotional activities on social media before the event, or records on Weibo after the event. Different promotion subjects or environments lead to different topics.
Topic	Examples
Topic 1: Prison Promotion	
Keywords	Province-wide, syphilis, physical examination, prison, hepatitis B, blood donation, testing point, morning, inmates, voluntary blood donation
Example	Example: "Guizhou Province Taiping Prison Launches 'World AIDS Day' Promotion and Condolence Activities" On the occasion of "World AIDS Day", the Taiping Prison Hospital conducted the theme of "Community mobilization for AIDS prevention, Healthy China, I take action" in the diversion center and the sick supervision. The "World AIDS Day" promotion and condolence activities were carried out to promote AIDS prevention and control knowledge and related policies to a large number of inmates through various forms such as hanging promotional banners, placing promotional boards, and distributing promotional materials. Prison leaders and relevant department heads participated in the promotion and condolence activities. The deputy warden made an educational speech to the inmates, encouraging them to establish confidence in overcoming the disease; hoping that they can concentrate on transformation, cooperate with treatment, and regain a new life; and distributed daily necessities to them.
Topic 2: goverment Promotion	
Keywords	project, villagers, Shanxi, Class B infectious disease, ethnic , development, Li Keqiang, research, console
Example	Yin Li, Deputy Secretary of the Provincial Party Committee and Governor, went to Butuo County in Liangshan Prefecture to inspect and guide the work of AIDS prevention and poverty alleviation. He emphasized the need to thoroughly study and implement the spirit of the Fourth Plenary Session of the 19th CPC Central Committee, conscientiously implement various decisions and deployments made by the central government, provincial party committee, and provincial government. The prevention and control of AIDS should be combined with efforts to overcome deep-seated poverty. This will ensure that Liangshan Yi Autonomous Prefecture synchronizes with other regions across China in building a moderately prosperous society in all respects. Yin Li visited Butuo County's antiviral treatment center and Lada Township Health Center to inspect and guide progress on AIDS prevention.
Topic 3: Medical promotion	
Keywords	new additions, Shenzhen, medical insurance, Beijing, Jiangsu, catalog, new drugs, core, Shenzhen, Daily
Example	Looking at the situation of new drugs added, there are a total of X drugs that have entered the medical insurance catalog, covering X clinical groups, accurately meeting the medication needs of tumors, chronic diseases, anti-infection, rare diseases, women, and children, etc. Among them, there are drugs for chronic diseases such as hypertension, diabetes, hyperlipidemia, and mental illness, drugs for tumors, drugs for anti-infection such as hepatitis C and AIDS, drugs for rare diseases, drugs for the treatment of COVID-19, and drugs for other fields, with a wide range of benefits for patients.
Topic 4: Campus promotion	
Keywords	school, lecture, Red Cross, teacher, live broadcast, campus visit, knowledge lecture, secondary school, parent, classroom.
Example	Over 90% of parents believe that learning about AIDS is extremely important for their children. #Youth AIDS Prevention Public Welfare Action# The Ministry of Education and four other departments jointly issued the "Opinions on Comprehensive Strengthening and Improving the Health Education Work of Schools in the New Era", requiring the implementation of specialized education on AIDS prevention, and strengthening education on puberty, sexual ethics, and sexual responsibility. At what age can children receive AIDS prevention education? How to educate children to stay away from AIDS? Recently, China Education Daily's WeChat public account conducted an online survey, and the results showed that more than 90% of parents believe that learning about AIDS-related knowledge is very important for their children, but parents said that although they occasionally pay attention to AIDS-related knowledge, they have never provided relevant education to their children. Strengthening AIDS prevention education needs to start with children.
Topic 5: Community promotion	
Keywords	street, women's federation, solidarity against AIDS, constitution, normal university, community health, rule of law, Liuzhou, publicity day, anti-cult, publicity week

Example	The Smile Blood Donation Team from Chengdu Normal University came to Liangshui Community to promote AIDS prevention knowledge in the community. During the activity, the volunteers popularized some small knowledge about AIDS prevention to the residents of the community and distributed some propaganda materials on AIDS prevention. The volunteers' propaganda achieved good results and received support and affirmation from the residents. Everyone participates in caring for life and preventing AIDS, which benefits every family. We hope that the volunteers' propaganda can receive more understanding and support!

Topic 6：Celebrity Promotion

Keywords	tomorrow, every minute, Huang Xiaoming, Peng Liyuan, helpless, indulgent, Panama, ignorant, goodwill ambassador, source
Example	On the local time of a certain month, Peng Liyuan, the wife of Chinese President Xi Jinping, who is also a goodwill ambassador for tuberculosis and HIV/AIDS prevention and control of the World Health Organization (WHO) and a special envoy for the promotion of girls' and women's education of the United Nations Educational, Scientific and Cultural Organization (UNESCO), met with the First Lady of Panama, Castillero, who is a special goodwill ambassador for HIV/AIDS planning in the Latin American region of the United Nations and the chairman of the National Comprehensive Care Council for Children in Panama, and jointly attended a public campaign event for HIV/AIDS prevention and control. After the meeting, Castillero invited Peng Liyuan to take a photo together holding the colorful paper butterfly, the symbol of the "Zero Discrimination" campaign against HIV/AIDS, to express firm support for the global efforts in HIV/AIDS prevention and control.

Table 5 Virus Status

abstract	The virus status expresses the specific topics of concern about viruses in the discussion and reflects the focus of public attention on the virus situation.
Topic	Examples
Topic 1: Sexual Transmission	
Keywords	girl, boy, breakdown, infection, revenge, discovered, husband, sexual relationship, netizens
Example	A few days ago, I saw such a news: a 16-year-old girl in Kenya had sex with a stranger at a party, and later found herself infected with AIDS. The girl was desperate to find the man to confront him, but he refused to admit it. The girl was once so broken that she wanted to commit suicide, but later she suddenly changed her mind: she decided to retaliate against more men and make them pay the price. So, in the following months, she had sexual relationships with several male students and married men. Even more terrifying, they were unaware of the infection, and it was not until more than a month later that they were exposed. During these days, several males continued to spread the disease without knowing it... Don't think that this kind of thing only exists abroad. In China, there are also many scumbags who retaliate against society. In recent years, there seem to be more and more cases of malicious transmission of AIDS. These people who spread the disease intentionally are more frightening than the disease itself. They are like demons walking in the world, dragging innocent lives into death.
Topic 2: Severity	
Keywords	incidence, carriers, CCTV, marriage, bacteria, infection, death toll, misconceptions, 70%, tableware
Example	[World AIDS Day | #What happens after HIV virus enters the body? #] #AIDS accounts for 70% of the incidence and death toll of infectious diseases # #In the initial stage of HIV infection, people may mistake it for physical weakness# What does the terrifying AIDS virus do after it enters the human body? When it infiltrates the body, it becomes invincible. The incubation period of AIDS can last for several years. If the original immune system can cope with 80% of the bacteria and viruses on the market, then the immune system infected with HIV can only resist 0.8% of them, which is a devastating blow to the human body. However, the preventive measures against AIDS are simple: practice safe sex and avoid contact with others' blood, including using separate tableware.
Topic 3: Other Transmission Routes	
Keywords	Mosquitoes, Cancer, Oral Cavity, Traditional Chinese Medicine, Saliva, Kissing, Abnormalities, Health Preservation, HPV, Sperm
Example	Can HIV be transmitted through kissing? Casual kissing does not transmit HIV. However, there is a possibility of transmission through deep kissing. The concentration of HIV in saliva is not high, but if the person infected with HIV has gingivitis or mouth ulcers, their saliva may contain blood or wound exudate, which can carry HIV into the partner's mouth. If the partner's oral mucosa is also damaged or bitten during deep kissing, HIV transmission can occur.

Table 6 Specific Groups

abstract	Specific groups refer to the specific populations discussed in the context, reflecting the high-risk patients associated with AIDS or controversial groups often discussed in people's stereotypes.
Topic	Examples
Topic 1：Elderly People	
Keywords	Elderly people, high incidence, Hunan, vigilance, industry, statistical data, worthwhile, young people, rural areas, male homosexuals
Example	Clearly they are already elderly, how can they still engage in sexual activity and how could they possibly contract HIV/AIDS? This is simply disrespectful to the elderly! The issue of elderly AIDS patients is rarely mentioned and is often avoided, but it is clearly a neglected group. According to the global statistics on AIDS from the UN AIDS program, in 2020, the incidence of AIDS among the elderly in China has significantly increased. From 2011 to 2020, the incidence of AIDS among people over 50 years old increased from 22% to 44%, while the incidence among those over 60 years old increased from 7.41% in 2010 to 18.21% in 2020. The reason for the high incidence of AIDS among the elderly is due to their physiological needs, which have been constantly called for. Many people believe that elderly people no longer have physiological needs because they are old, but as long as people are alive, they will have physiological needs. This is not something to be ashamed of. Due to the lack of awareness of prevention of AIDS and sexually transmitted diseases, most elderly people abandon contraceptive measures when they feel that their chances of reproduction have decreased or after menopause, unknowingly losing protection against diseases.
Topic 2：Homosexuality	
Keywords	Attraction, Homosexuality, Movies, Immorality, Kunming City, Gender, Reality, Gay, Violence, Heterosexuality
Example	The consequences of immorality (summarizing the evils that may arise) - Before quitting immorality, we should first understand what it is. What is immorality? Immorality includes three types: physical, verbal, and mental. (1) Physical immorality includes self-gratification and extramarital sexual relations with the opposite sex, such as premarital cohabitation, premarital sexual activity, extramarital affairs, mistress keeping, self-gratification, homosexuality, and so on. Even though a husband and wife follow the Zhougong ceremony, it is not considered immorality.

Table 7 Positive Feedback

abstract	Positive feedback refers to various positive appeals to people living with HIV/AIDS, which overlaps with promotional activities, but emphasizes a positive attitude, not just education and events.
Topic	Examples
Topic 1: Respect	
Keywords	Respect, Warmth, Prejudice, Hello Tomorrow, Indifference, One More Step, Stop, Disabled
Example	Many infected individuals are afraid of discrimination. Many people living with HIV/AIDS do not dare to speak out or receive treatment at the hospital, allowing the virus to spread freely within their bodies, and their once hopeful lives gradually fade away. Under the light of candles, volunteers pledged and prayed for those living with HIV/AIDS. We will not discriminate against any HIV/AIDS patients, and we hope they can overcome the disease as soon as possible. Later, all volunteers solemnly wrote their names on the HIV/AIDS prevention banner. This event not only deepened people's understanding of HIV/AIDS prevention and enhanced their self-protection awareness but also taught people to respect and care for those living with HIV/AIDS. They are also victims and deserve to be treated with kindness in this world. If we can show more respect and care for those living with HIV/AIDS, the sunshine will reach more corners of the world. May the world be filled with love!
Topic 2: De-stigmatization	
Keywords	Fear, Speak Up, Misunderstanding, Yixing, Ignorance, Stigma, Courageous, TFBOYS, Deserve, Attitude Change
Example	On his 19th birthday, Yixing (a Chinese pop star) said, "I hope to encourage my fans to eliminate their unwarranted fear of HIV/AIDS." By using his influence, he called on the younger generation to accept education and reject discrimination. Only with such actions can we resonate with young people. Let's join the positive idol Yixing from the TFBOYS in speaking up bravely for HIV/AIDS. #YixingLoveFoundation #Happy19thBirthdayYixing
Topic 3: Acceptance	
Keywords	Embrace, Communist Youth League, warmth, convey, medical college, medical university, peers, transportation, sunshine, time.
Example	In order to further encourage the participation of teachers and students on campus, the School of Finance has set up a pair of cartoon dolls with a big sign that reads "I am an AIDS patient, can you give me a hug?" At the beginning of the event, passing students looked at the dolls with caution and suspicion and were unwilling to approach them. Due to the lack of knowledge about AIDS, many students even asked: "Will I get infected by hugging them?" As the event progressed, some students took the initiative to embrace the dolls, even though it was a brief hug, it still reflected the heartfelt care of our students for AIDS patients. Our school leaders also took the initiative to embrace the dolls, setting an example for students. Li Guoqiang, Secretary of the School Party Committee, said: "The first thing we need to do for AIDS is to eliminate discrimination and embrace them with love." At the beginning of the event, the indifference, coldness, and rejection of the students' eyes also deeply hurt them. They would think that even with a thick doll in between, many people were unwilling to give a simple hug. If they were really an AIDS patient, what kind of discrimination would they face? As the event progressed, more and more leaders, teachers, and students gave them the deepest care and enthusiastic acceptance.

Table 8 The distribution of sentiments in primary and secondary themes

Year	Sentiment	Total number	Virus Staus	Positive Feedback	Specific Groups	Specific Topics	Promotion	Response Method	*P* value
	Positive	6100	323 (5.3)	581 (9.5)	199 (3.3)	1352 (22.2)	2507 (41.1)	1138 (18.7)	<0.001
2018	Neutral	1135	105 (9.3)	90 (7.9)	77 (6.8)	289 (25.5)	408 (35.9)	166 (14.6)	
	Negative	2692	499 (18.5)	232 (8.6)	177 (6.6)	745 (27.7)	600 (22.3)	439 (16.3)	
	Positive	3821	229 (6.0)	475 (12.4)	315 (8.2)	332 (8.7)	1868 (48.9)	602 (15.8)	<0.001
2019	Neutral	799	83 (10.4)	69 (8.6)	101 (12.6)	125 (15.6)	295 (36.9)	126 (15.8)	
	Negative	1696	305 (18.0)	196 (11.6)	182 (10.7)	244 (14.4)	461 (27.2)	308 (18.2)	
	Positive	3407	153 (4.5)	431 (12.7)	249 (7.3)	277 (8.1)	1819 (53.4)	478 (14.0)	<0.001
2020	Neutral	620	69 (11.1)	56 (9.0)	33 (5.3)	61 (9.8)	318 (51.3)	83 (13.4)	
	Negative	1582	296 (18.7)	133 (8.4)	143 (9.0)	194 (12.3)	608 (38.4)	208 (13.1)	
	Positive	3239	328 (10.1)	338 (10.4)	287 (8.9)	398 (12.3)	1292 (39.9)	596 (18.4)	<0.001
2021	Neutral	1044	143 (13.7)	41 (3.9)	131 (12.5)	313 (30.0)	266 (25.5)	150 (14.4)	
	Negative	2655	388 (14.6)	83 (3.1)	188 (7.1)	687 (25.9)	635 (23.9)	674 (25.4)	
	Positive	2127	255 (12.0)	182 (8.6)	131 (6.2)	182 (8.6)	868 (40.8)	509 (23.9)	<0.001
2022	Neutral	585	142 (24.3)	34 (5.8)	33 (5.6)	63 (10.8)	179 (30.6)	134 (22.9)	
	Negative	1374	466 (33.9)	71 (5.2)	57 (4.1)	261 (19.0)	231 (16.8)	288 (21.0)	

Figure

Figure 1. Topic extraction using LDA topic models and Bayesian network diagram

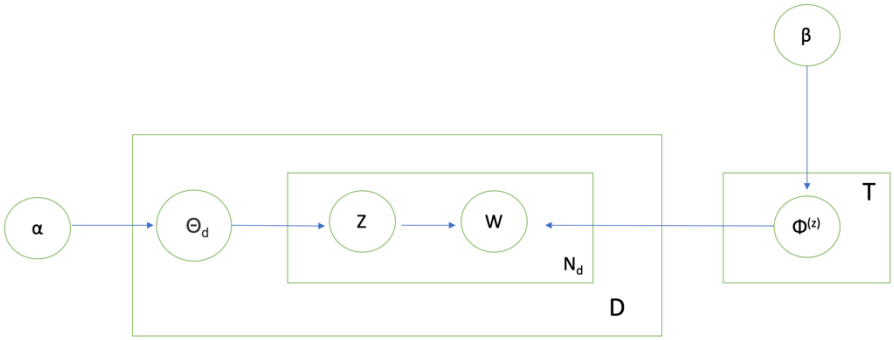


Figure 2 Number of topics (K value) and log-likelihood values

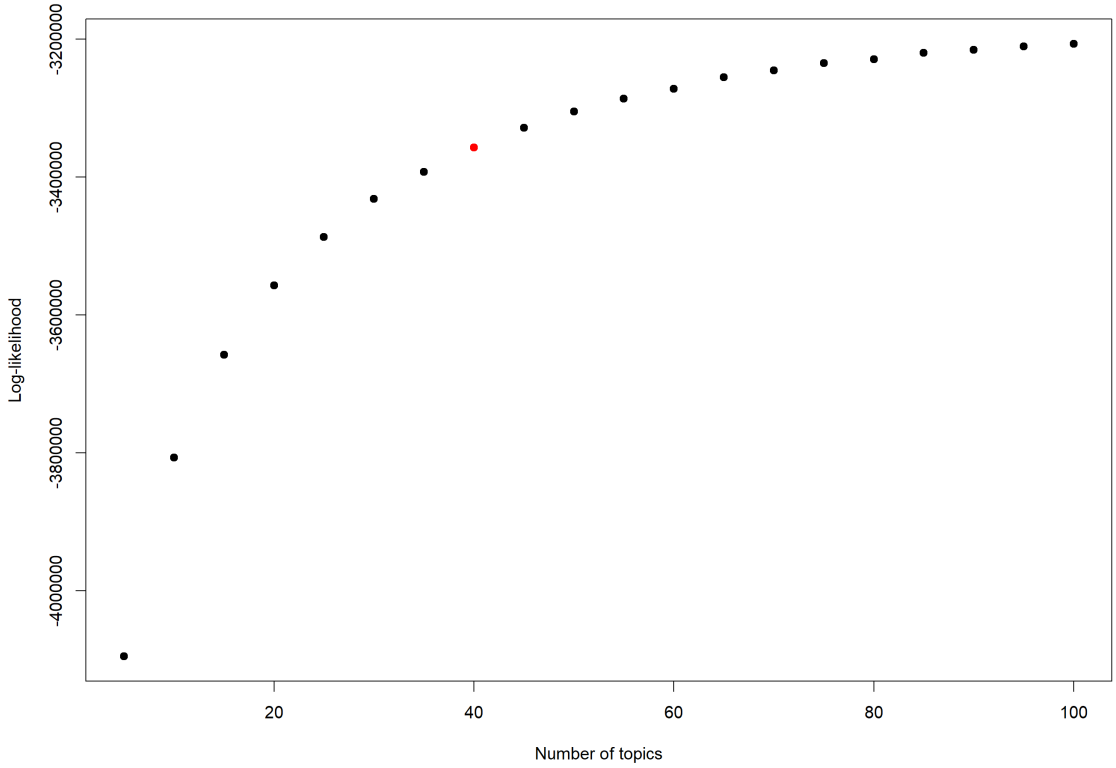


Figure 3 Distribution of sentiment over the five-year themes

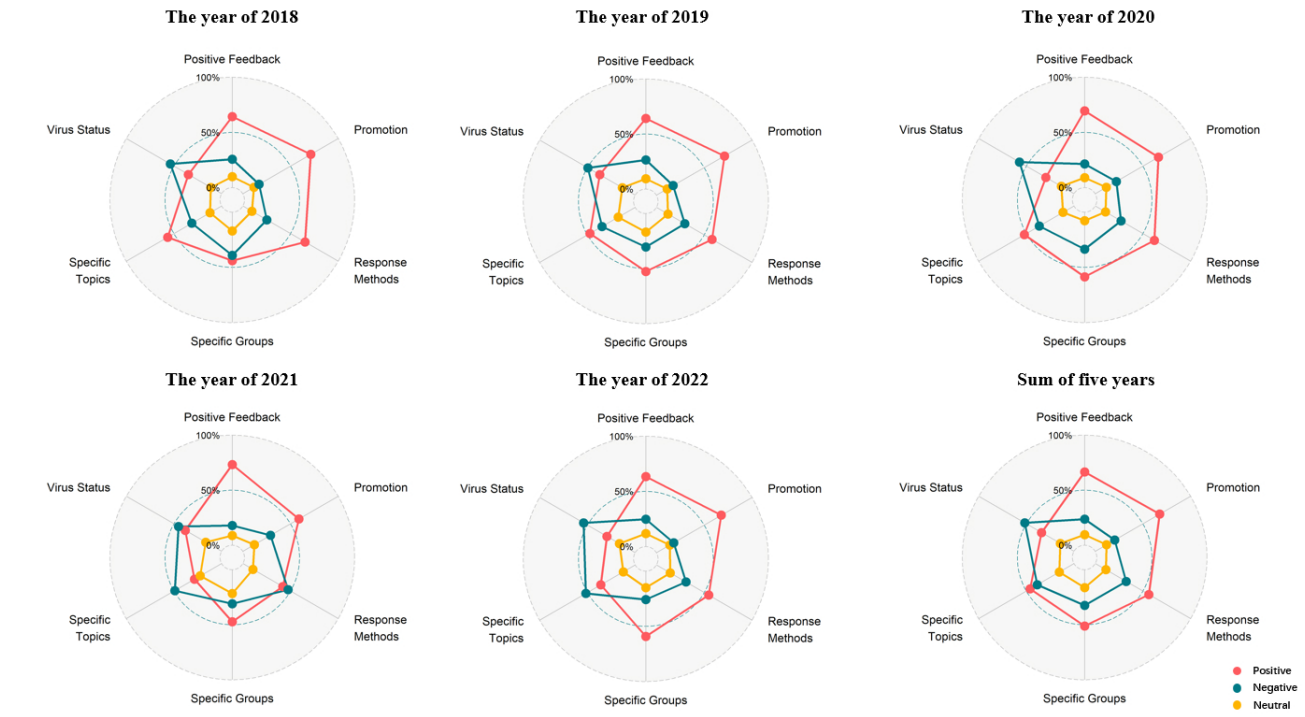


Figure 4 Heatmap of participation index

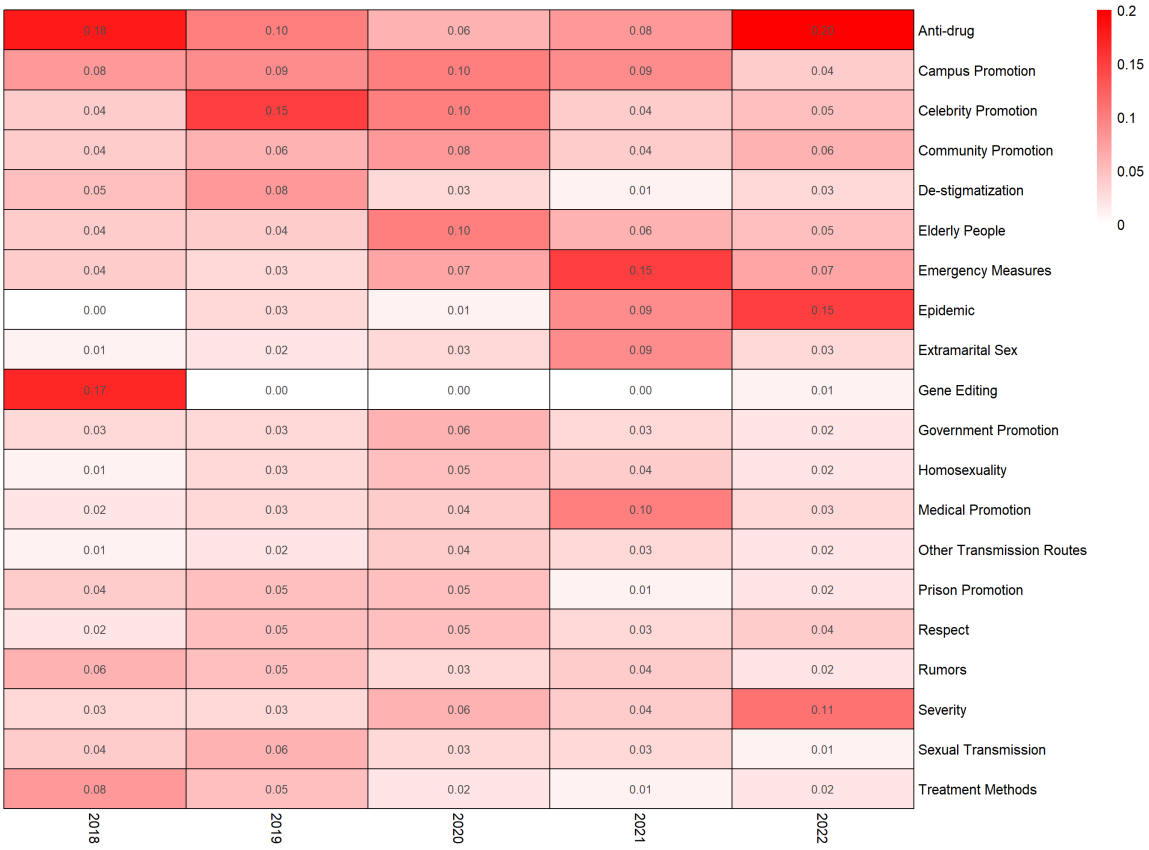
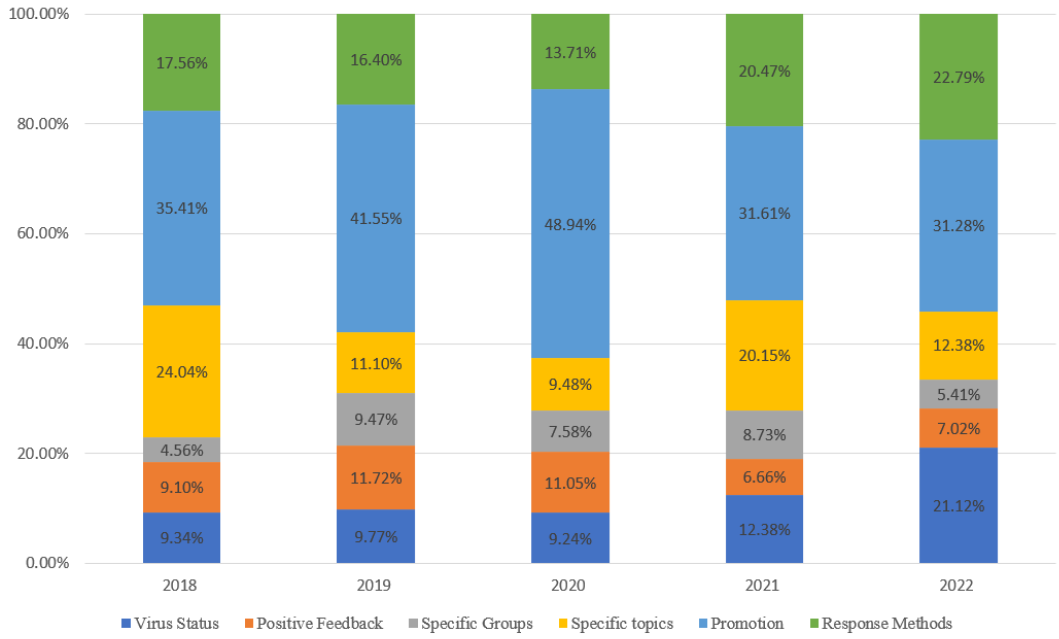


Figure 5 Thematic map of the five years from 2018 to 2022



Figures 6 Distribution of 21 topics across six themes