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Yifan Zeng
Second Affiliated Hospital of Zhejiang University
Yulin Han
Zhejiang University
Yu Chen
Fujian Polytechnic Normal University
Siquan Zeng
Sanming University
Zhangyan Li
Jonzhangyan@gmail.com

Xiamen University

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Who Sets the Agenda? Actor Differentiation and Agenda Dynamics in China's "Weight Management Year" Campaign

Yifan Zeng[1#], Yulin Han[2#], Yu Chen[3#], Siquan Zeng[4#], Zhangyan Li[5]*

[1] Department of Ultrasound in Medicine, The Second Affiliated Hospital of Zhejiang University School of Medicine, Zhejiang University, Hangzhou, 310009, China.

[2] College of Media and International Culture, Zhejiang University, Hangzhou 310058, Zhejiang, China

[3] School of Art and Communication, Fujian Polytechnic Normal University, No. 1, Campus New village, Longjiang Street, Fuqing City, Fujian Province, 350300, China

[4] School of Information Engineering, Sanming University, Sanming, 365004, China.

[5] School of Journalism and Communication, Xiamen University, Xiamen, 361005, China.

[#]These authors contributed equally.

***Corresponding author:** Zhangyan Li

School of Journalism and Communication, Xiamen University, 422 Siming South Rd., Siming District, Xiamen City 361005, China. Tel and Fax: +86 18858190131

E-mail: Jonzhangyan@gmail.com

ORCID:

Yifan Zeng, https://orcid.org/0009-0008-3357-5974

Yulin Han, https://orcid.org/0009-0004-9107-9806

Yu Chen, https://orcid.org/0000-0003-2039-9111

Siquan Zeng, https://orcid.org/0009-0002-8220-5626

Zhangyan Li, https://orcid.org/0009-0003-5404-7365

Abstract

Background: More than half of Chinese adults are overweight or obese, making weight management a major public health priority. In June 2024, China's National Health Commission and 15 other government departments launched a three-year national "Weight Management Year" campaign. However, little is known about whether different communication actors play distinct roles in directing and sustaining public attention to specific components of weight management.

Objectives: Drawing on second-level agenda-setting theory and the collaborative communication framework, this study examined the temporal relationships between the attention of government, media, and civil society organizations and public attention to different weight-management topics on Chinese social media.

Methods: We collected 74,824 weight-management-related posts published on Sina Weibo, a major platform for public discourse in China, between March 1 and June 20, 2025. Latent Dirichlet allocation was used to identify 15 weight-management subtopics. Granger causality tests and impulse response analyses were then used to assess topic-specific temporal predictive relationships between institutional and public attention.

Results: Exploratory analyses identified five topic-specific temporal relationships. Government attention temporally predicted subsequent public attention to policy guidance and disease risk. Attention from civil society organizations was associated with more sustained subsequent public attention to two diet-management topics. However, these relationships were sparse relative to the range of topics examined and did not form a consistent pattern of cross-actor complementarity.

Conclusions: Government, media, and civil society organizations showed limited but topic-specific differences in their temporal relationships with public attention to weight management. These findings highlight the potential value of clearer actor-specific communication roles and greater cross-sector coordination in national obesity-

prevention communication, particularly for sustaining public attention across different components of weight management.

Keywords: health communication, agenda-setting, collaborative communication, obesity, social media

Introduction

In recent years, the obesity crisis in China has become increasingly severe. According to the National Health Commission [1], over 50% of Chinese adults are either overweight or obese. Among youth aged 6 to 17, the prevalence of overweight is 11.1%, while the obesity rate stands at 7.9%. The issue also extends to university students, whose obesity rate reached 5.5% in 2020 [2]. Over the past decade, obesity rates have continued to climb, with adult obesity increasing by nearly nine percentage points between 2015 and 2020 [3]. Among primary and secondary school students, the combined rate of overweight and obesity rose from 15.5% in 2010 to 24.2% in 2019 [4]. Economically, the projected overweight- and obesity-related medical expenditure is expected to reach 418 billion RMB by 2030, accounting for 21.5% of the country's total health spending [5]. In 2021, China was home to over 400 million overweight or obese adults, the highest number worldwide [6].

In response to this trend, the Healthy China 2030 strategy set national targets aimed at curbing the rise in obesity [7]. However, a 2023 report highlighted the continuing rise in overweight and obesity among Chinese children and adolescents and called for multifaceted interventions [8].

Previous studies have noted that, as with many other public health issues, dominant discourses on obesity in China tend to rely heavily on individualistic frames of responsibility. Behaviors such as overeating, excessive calorie intake, and sedentary lifestyles are commonly cited as the primary causes. Yet such individual-centered approaches have been described as "common but futile" [9] (p S14). A growing body of scholarship instead emphasizes the structural and social dimensions of obesity, advocating for interventions that target social networks and environmental factors to support physical activity [10].

Lawrence [11] argues that personal autonomy in weight control is often constrained by broader environmental forces. In contexts saturated with junk food advertising, the

ubiquity of fast-food chains, and prohibitive costs or limited access to gyms, placing sole responsibility on individuals is not only misleading but also counterproductive. Numerous studies have pointed to marketing [12], dietary patterns [13], and social networks [14] as critical drivers of obesity. Brownell and his colleagues conceptualize these factors as "suboptimal defaults" that "undermine or hijack biological and psychological regulatory systems for eating and weight control" [15] (p 381). Such factors, they argue, should be central to any discussion of obesity.

Building on this critique, Brownell et al [9] proposed a public health model of obesity that shifts attention to environmental and population-level determinants, and repositions responsibility not only on individuals but also on governments, industries, and the public. We adopt this framework as the foundation of our study, operating on the premise that obesity prevention should be understood as a collective public health challenge, not simply a matter of individual willpower. Collective action and institutional interventions, in this view, represent more promising solutions.

This perspective appears to align with recent developments in Chinese public health policy. In June 2024, the National Health Commission, along with several government ministries, launched a three-year campaign titled the "Weight Management Year" initiative [16]. By the time of the 2025 National People's Congress, "weight management" had become a nationally recognized issue, prompting widespread media attention and signaling a coordinated effort to amplify the campaign's visibility [17].

Our research focuses on the roles of government, media, and organizational actors in this wave of obesity-related discourse. Specifically, we examine how these diverse stakeholders have engaged in agenda-setting and contributed to the campaign's communication impact. We argue that through the establishment of collaborative mechanisms among key actors, it becomes possible to tailor communication strategies and design issue-specific messaging frameworks. Grounded in theories of collaborative communication and second-level agenda-setting, this study investigates how different stakeholders prioritize different obesity-related themes and whether their interactions

display complementary or synergistic patterns in public health messaging.

Literature Review

This paper engages with the concept of collaborative communication proposed by Wei and Li [18]. Although their concept was originally developed for the context of international communication, we argue that it provides a valuable framework for analyzing collaborative effects among media actors. Synergy theory originated in the 1970s and was first introduced by German physicist Hermann Haken, who systematically explained the fundamental principles of synergy in his book Synergetics [19]. Haken believed that synergy refers to the interaction among subsystems within a system that leads to the formation of new, ordered structures, thus enabling the realization of complex functions that individual components could not achieve on their own. Based on this idea, Wei and Li [18] define communicative synergy as a model in which multiple actors coordinate and collaborate to systematically produce, share, and disseminate information in order to maximize overall communicative impact.

Collaborative communication is characterized by three key features. First, multi-actor participation: the most prominent distinction of collaborative communication compared to other models is the diversity of communicative actors. Only through the joint participation of multiple entities—governments, media, corporations, and the public—can collaboration be achieved. Second, systemic operation: all actors must share resources and divide responsibilities to form an organic system with a common goal, rather than acting in isolation. Third, overall efficiency: the effect of collaborative communication exceeds the sum of individual or uncoordinated communication efforts. It represents a synergistic and dimensional amplification rather than a simple additive effect [18].

Collaborative communication includes three layers: actor collaboration, content collaboration, and channel collaboration. Actor collaboration is the starting point of international collaborative communication. Unlike traditional linear communication,

collaborative communication emphasizes the collective role of information creators, disseminators, and receivers. This multi-actor participation disrupts the linear transmission model and introduces more complexity and dynamism to communication processes [20]. The theory of the "communication ecosystem" suggests that effective communication depends on the organic interaction of various actors. Governments, media, corporations, civil society organizations, and the public all play different roles and maintain interdependence within the system [21]. Only through coordination and unified strategies can these actors gain dominance in global information flows [22]. In this article we focus on actor collaboration.

The concept of collaborative communication resonates with the public health model of obesity proposed by Brownell et al [9], which treats obesity as a societal rather than personal issue. Previous studies have examined the coverage of obesity in the public health field, with a central focus on content. Early research found a severe lack of content coordination and significant bias. Dorfman et al [23] pointed out that the "market justice" frame was extensively and effectively employed by the food industry, emphasizing consumer choice and individual control over health, while downplaying the role of society. News coverage reinforced this narrative [24]. Kim and Willis [25] found that news stories using personal responsibility frames significantly outnumbered those employing social frames. Reports on childhood obesity likewise emphasized personal over social causes [26]. A content analysis of obesity-related YouTube videos showed similar findings—personal causes and solutions received far more attention than societal ones [27]. Although the use of social frames has reportedly increased in obesity reporting [11], the overall trend remains that “social responsibility is largely ignored, while personal causes and solutions are repeatedly emphasized” [25] (p 361). Sun et al [28] demonstrated that socially-framed news could effectively raise awareness of obesity as a public issue and mobilize collective action. These studies all call for a coordinated framing approach that goes beyond the individual level and adopts a broader framework of social mobilization.

However, beyond content, actor collaboration has been neglected in obesity-related

communication. Wallack and Lawrence [29] emphasized that health professionals and journalists need to align their goals to communicate the social causes and responsibilities behind issues like obesity. However, their discussion remained at the level of content reform and did not address actor-based collaboration. Compared with the thoroughly examined content dimension, we are more interested in how different actors—particularly non-mainstream entities in the social media age such as government accounts, civil organizations, and social influencers—play distinct roles and how they exert their influence.

In the network age, Castells [30] argued that the traditional state-led communication model is being replaced by multi-actor collaboration within the network society. In the information society, communicative power is decentralized; governments, media, NGOs, and ordinary netizens all occupy key positions in communication networks. Any node can become a center of influence. Through the internet and social media, actors can quickly form alliances and launch coordinated communication efforts. This decentralized synergy enhances the speed and breadth of communication and empowers more actors to participate. This also echoes Brownell et al's [9] call to mobilize different social actors in addressing obesity.

We draw on second-level agenda-setting theory to explore the role of communicative actors. The traditional agenda-setting effect refers to how certain issues are highlighted in public consciousness, and how issue importance shifts from media to the public [31]. These studies typically focus on general attention to issues. However, "lower" levels of agenda-setting may operate differently, producing varying outcomes across media, public opinion, and policy priorities [32,33]. First-level agenda-setting focuses on issue salience, while second-level agenda-setting highlights the attributes of issues, including their causes and proposed solutions [33]. In essence, the "agenda" in second-level agenda-setting refers to the "attribute agenda." As a complex, multidimensional issue, obesity comprises various attributes or subtopics. The thematic attention of each actor—measured by the proportion of posts on specific subtopics—constitutes their attribute agenda. Analyzing how these attribute agendas align across different actors

over time forms the framework of our study. Therefore, under the primary issue of the "Weight Management Year Initiative," we aim to explore which subtopics different actors emphasized and what communicative effects resulted.

Based on this, we propose the following research questions:

1.Which actors participated in the "Weight Management Year Initiative," and what issues did they focus on?

2. Did these actors display topic-specific agenda-setting relationships with public attention?

3. Did the observed relationships indicate complementary or collaborative patterns among these communicative actors?

Methods

Data Collection and Preprocessing

We collected 74,824 Sina Weibo posts and their corresponding metadata using Python over a 112-day period from March 1 to June 20, 2025. Search queries included "成人肥胖食谱指南(Adult Obesity Dietary Guidelines)," "科学减重(Scientific Weight Loss)," and "体重管理(Weight Management)." The retrieved included verification status and account information used for subsequent user classification. The daily distribution of collected posts over the study period is presented in Figure 1.

Topic Modeling

Latent Dirichlet Allocation (LDA) [34] was employed to identify issue attributes central to second-level agenda-setting [35]. LDA has been widely used to extract topics from Twitter and Weibo posts for temporal agenda-setting analysis [36,37]. In our study, we adopted LDA to uncover the latent thematic structure in Weibo posts and to interpret how different actors shape public discourse around weight management. In our study,

we adopted LDA to uncover the latent thematic structure in Weibo posts and to interpret how different actors shape public discourse around weight management [38].

Although we also tested Biterm Topic Modeling (BTM) [39] and Neural Topic Modeling [40] on a random subset of posts, their results showed greater thematic overlap and less clearly distinguishable topic structures upon manual inspection. Due to LDA's effectiveness in handling large-scale datasets and its interpretability, we chose it as the primary topic modeling method for this research.

Before modeling, we conducted the following preprocessing steps:

Removed high-frequency function words (e.g., 的, 是, 在) that lack semantic content to enhance topic coherence.

Eliminated whitespace, newline characters, empty symbols, and single Chinese characters, as these rarely form complete semantic units in Chinese.

Filtered out punctuation marks, emojis, and special characters to reduce noise.

For example, prior to cleaning, a topic word set might include ["的", "是", "！！！", "真的", "哈哈", "体重", "减肥"], which after preprocessing became ["体重", "减肥", "运动", "健康", "饮食", "锻炼", "瘦身"].

Due to the lack of natural word delimiters in Chinese text, word segmentation was a necessary prerequisite. We used the Jieba tokenizer [41] to segment sentences into individual words. To improve segmentation accuracy—since many specialized terms are not included in Jieba's default dictionary—we constructed a customized dictionary and applied a widely used Chinese stopword list [42] to remove pronouns, prepositions, and other non-content words. Words with a frequency below 5 or that appeared in more than 50% of documents were also excluded. This left a refined vocabulary of 30,969 terms for topic modeling. The average post length was 211 characters, with a median of 142.

The LDA model was trained with 10 passes and 50 iterations per pass, using a fixed random seed (random_state=42) to ensure reproducibility.

To determine the optimal number of topics, we followed established protocols and used topic coherence scores as a measure of model quality. We balanced generalizability and specificity: too many topics risk producing narrow and overlapping clusters [43], while too few result in overly broad topics [44]. Models were trained using topic numbers ranging from 10 to 30, and the topic configuration with the highest coherence score was selected.

Following previous practices [45,46], we manually labeled topics by analyzing the top keywords per topic and reading representative high-probability posts. Ultimately, we found the 15-topic solution both optimal in coherence and interpretability. The representative keywords for each of the 15 LDA topics are shown in Figure 4. These 15 topics formed the thematic basis for the descriptive analysis in RQ1 and the time-series analyses addressing RQ2 and RQ3.

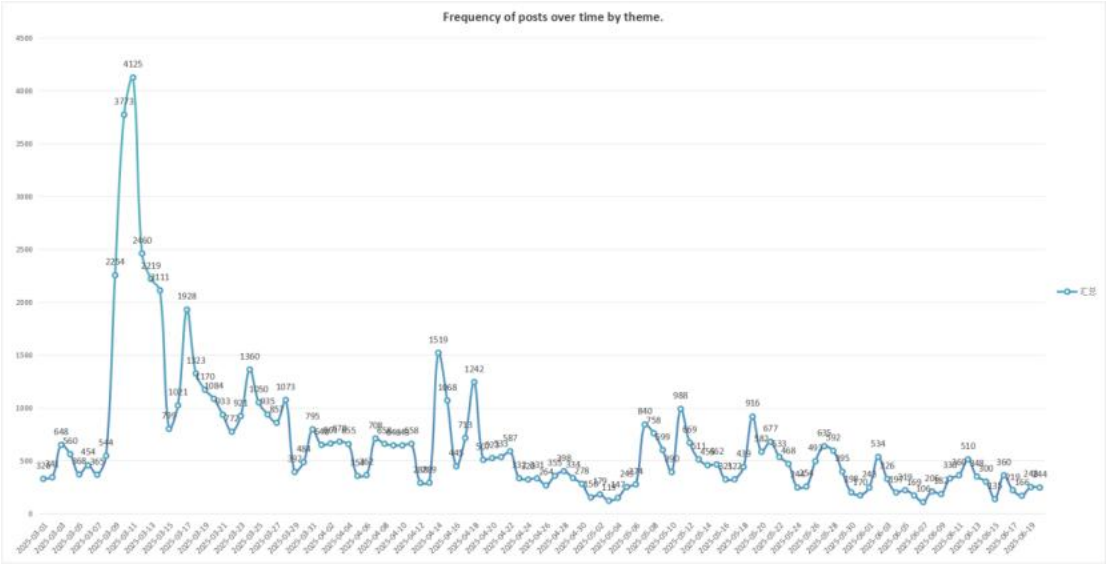


Figure 1 Frequency of posts over time.

In examining the second-level agenda-setting relationships among social media actors in China, we treat these 15 topics as issue attributes of weight management policy.

User Classification and Selection

Drawing on Wei and Li's [18] theory of collaborative communication, a wide range of actors are considered within the scope of potential coordination. Based on Weibo's user verification system, eight distinct account types were identified: unverified users (i.e., general public, n = 24,101), individual users (n = 14,689), media organizations (n = 14,500), enterprises (n = 4,016), civil groups (n = 1,635), websites (n = 2), campus accounts (n = 952), and government agencies (n = 14,929). These categories were derived from Weibo's platform-provided verification labels.

Given the similarity in function and status between unverified and verified individual users, we merged these two categories into a unified group representing "the public"—the primary audience and target of agenda-setting. For the purpose of analyzing collaborative dynamics, we excluded website and campus accounts due to their negligible sample sizes and limited predictive capacity, yielding an analytic sample of 73,870 posts. Our selection focused on actors with both quantitative presence and theoretical agenda-setting potential.

Specifically, actors with a higher number of posts were prioritized, as volume may intuitively correlate with visibility and influence. Moreover, we paid particular attention to actor autonomy: whereas government and media are often tightly linked under state control, we were especially interested in whether civil society actors could meaningfully participate in the collaborative process. To that end, we combined enterprise accounts (n = 4,016) and civil groups (n = 1,635) into a broader "nongovernmental organizations" category, representing a relatively autonomous societal force.

As a result, our final Granger causality models focused on four actor types: general users (public), government agencies, media organizations, and civil organizations. All interactor dynamics in the model were restricted to these four categories.

Time Series Analysis

To examine whether past attention from government, media, and civil organizations improved the prediction of subsequent public attention to health-related topics, we employed Granger causality analysis, a classical econometric tool for multivariate time-series data. Developed by Clive W. J. Granger, the method evaluates whether the past values of one time series improve forecasts of another. Because Granger causality indicates temporal predictive precedence rather than causal influence, we interpret the results as evidence of directional agenda relationships [47,48]. The method has also been used in panel and time-series applications [49-52].

From a collaborative communication perspective, the test results offer insight into differential predictive relationships across content areas and provide indirect evidence for assessing whether complementary patterns are present.

Based on the actor classifications above, we conducted three sets of Granger causality tests to examine predictive linkages between each institutional actor (media, civil organizations, and government) and public attention to weight-management topics. This analysis addressed RQ2 and provided indirect evidence for RQ3 by comparing the coverage and complementarity of topic-specific relationships. Given the exploratory aim, we report exact unadjusted two-sided p-values and use $p < .05$ as the threshold for identifying relationships for subsequent IRF analysis. Because 45 Granger tests were conducted, the potential for multiple-testing inflation is acknowledged and should be considered when interpreting these exploratory findings.

To prepare the data for Granger testing, we converted post timestamps into daily time-series format. For each actor and day, agenda salience was operationalized as the proportion of the actor's posts assigned to each topic. We constructed 60 daily series covering 15 topics and four actor groups, first-differenced each source-public pair, and estimated 45 bivariate models. The optimal lag length was selected from 1 to 5 using the Akaike Information Criterion (AIC), after which vector autoregressive (VAR) models and Granger causality tests were estimated on the differenced series.

We further applied generalized cumulative Impulse Response Function (IRF) analysis to describe the trajectory and persistence of public responses to shocks in institutional attention. Pointwise 95% confidence intervals were estimated using 2,000 residual-bootstrap replications.

Following prior agenda-setting applications of dynamic time-series models [36,53-55], we simulated a one-time shock in which the focal actor's share of attention to a topic increased by 10% relative to its observed mean. Because the data were daily, responses were traced over the subsequent 10 days. IRFs were estimated for the five paths that met the exploratory unadjusted threshold.

Results

Topic Frequency and Temporal Dynamics

Table 1 summarizes the frequency distribution of social media posts across the 15 secondary-level topics and their classification into five primary thematic categories. At the Level 1 thematic level, Topic Cluster 3: Scientific Weight Loss and Individual Practice accounted for the largest share of content, with a total of 24,713 posts. This was followed by Topic Cluster 1: Policy Advocacy and Institutional Governance (n = 14,995), Topic Cluster 4: Medical Services and Chronic Disease Intervention (n = 13,511), and Topic Cluster 5: Health Communication and Social Mobilization (n = 13,096), which exhibited similar frequencies. The least discussed cluster was Topic Cluster 2: Behavioral Control and Dietary Regulation, with 8,509 posts.

Level 1 Theme	Level 2 Topic	n
Policy Advocacy and Institutional Governance	Topic 1. National Health Guidelines and Weight-Loss Policy Release	4,673
	Topic 9. National Weight Management Campaigns and Check-in Challenges	8,242

	Topic 13. Workplace Clinics and Corporate Health Accountability	2,080
Behavioral Control and Dietary Regulation	Topic 2. Intermittent Fasting, Dietary Energy, and Weight Management	2,073
	Topic 7. Meal Sequencing and National Obesity-Control Guidelines	3,125
	Topic 8. Satiety-Based Diets, Glycemic Control, and Breakfast Management	3,311
Scientific Weight Loss and Individual Practice	Topic 3. AI Body-Fat Scales and Smart Weight-Loss Devices	3,829
	Topic 11. Scientific Framing and Body Anxiety in Weight-Loss Discourse	8,927
	Topic 10. Personal Weight-Loss Experiences and Body Transformation Narratives	11,957
Medical Services and Chronic Disease Intervention	Topic 5. Hospital-Based Obesity Interventions	1,477
	Topic 6. Obesity and Disease Risk	6,694
	Topic 12. Medical Nutrition Services and Health Activities	5,340
Health Communication and Social Mobilization	Topic 4. Exercise, Diet, and Body Metabolism	6,994
	Topic 14. National Nutrition Education and School Health Promotion	3,794
	Topic 15. Health Products, Market Technologies, and Trend Observations	2,308

Table 1: Frequency distribution of social media posts across the 15 secondary-level topics.

At the Level 2 topic level, the most frequently discussed topic was Topic 10: Personal Weight Loss Experiences and Body Transformation Narratives (n = 11,957), which falls under the "Scientific Weight Loss and Individual Practice" category. It was followed by

Topic 11: Scientific Framing and Body Anxiety in Weight Loss Discourse (n = 8,927), and Topic 9: National Weight Management Campaigns and Check-in Challenges (n = 8,242). Conversely, the least discussed topics were Topic 5: Hospital-Based Obesity Interventions (n = 1,477) and Topic 13: Workplace Clinics and Corporate Health Accountability (n = 2,080).

All five Level 1 thematic clusters exhibited notable temporal cycles, with a sharp surge in discussion volume on March 11. Figure 2 shows the temporal distribution of posts across themes during the observation period. Xinhuanet announced its National 100-Day Light Body Plan on March 25 and formally launched it on May 11, 2025 [17,56]. The initiative promoted healthy diets and healthy lifestyles. The recurrence of campaign-related discussions over the following three months is consistent with sustained campaign-related attention. These descriptive patterns do not establish that a particular campaign launch caused the March 11 peak or demonstrate an agenda-setting effect.

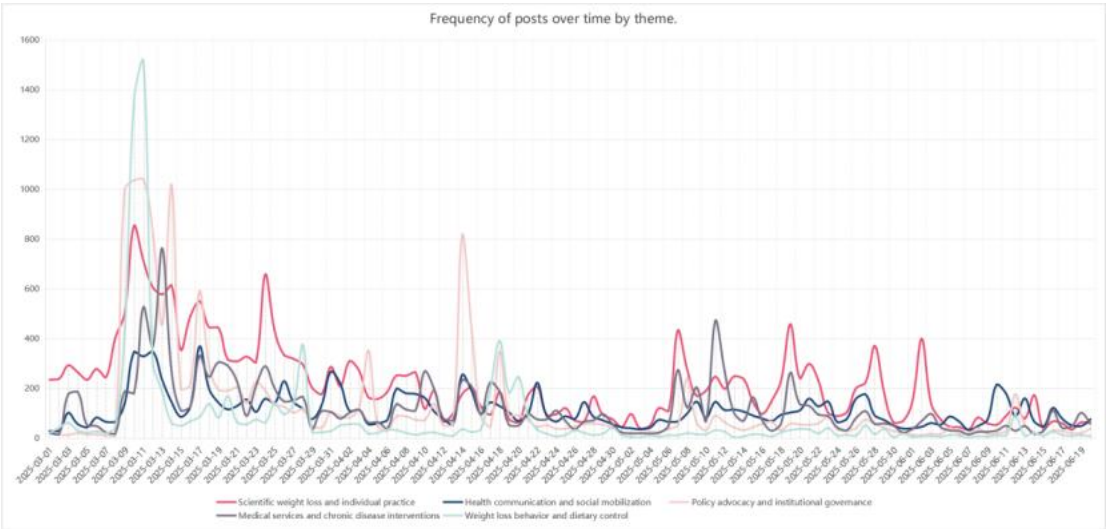


Figure 2 Frequency of posts over time by theme.

Figures 3 and 4 illustrate the number of posts and the percentage distribution of topics by actor type. Government, media, and organization accounts show broadly similar topic proportions, indicating content-level similarity. In contrast, posts by public users show a tendency toward personalization. Public users posted a large number of contents

related to Scientific weight loss and individual practice, which aligns with the UGC feature of sharing personal experiences. The second most frequent topic among them was Health communication and social mobilization, which included extensive weight-management information. This indicates that the focus of public users' content differs from that of the three institutional actors

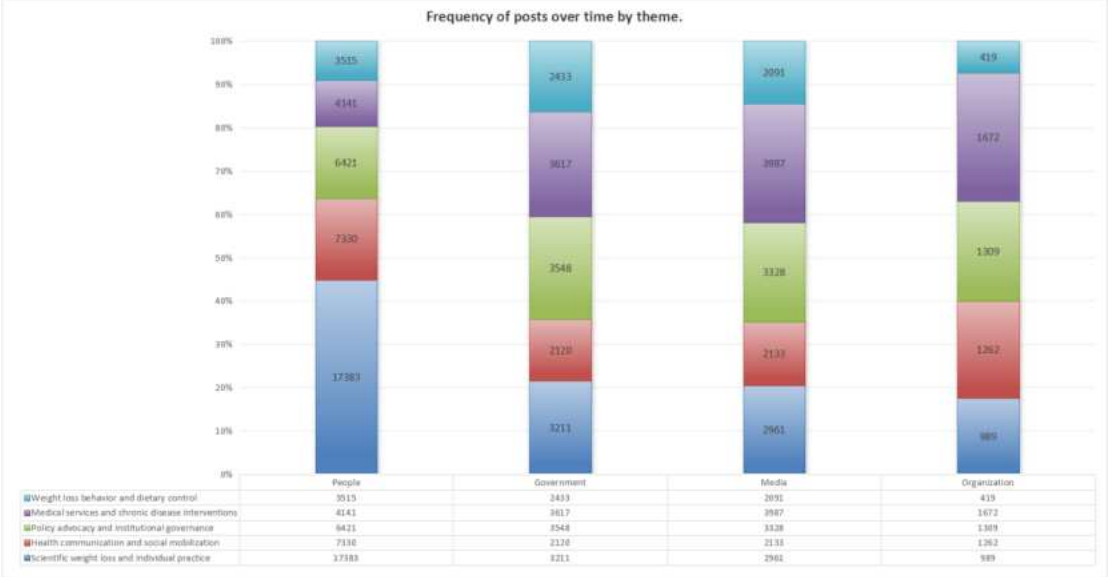


Figure 3 Proportional Distribution of Posts by Primary Topic Clusters

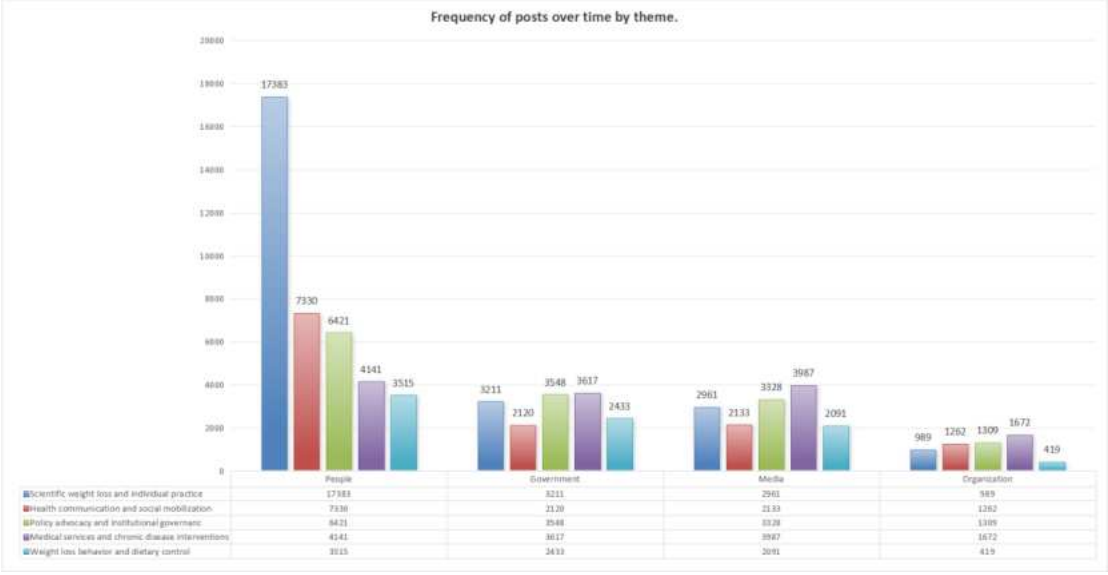


Figure 4 Proportional and Number Distribution of Posts by Primary Topic Clusters

Second-Level Agenda-Setting

To investigate topic-specific agenda relationships, we estimated 45 bivariate Granger causality tests between media, organizational, and government attention and subsequent public attention across 15 topics. At the exploratory unadjusted threshold of $p < .05$, five institutional-to-public relationships were identified. The relationships were concentrated in different topics and displayed different temporal profiles across actors.

Media accounts showed one predictive relationship with public attention: Topic 6, concerning obesity and disease risk, Wald chi-square(2) = 7.60, $p = .022$. No other media-to-public relationship met the exploratory $p < .05$ threshold.

Organizational accounts showed two predictive relationships with public attention: Topic 2, concerning intermittent fasting, dietary energy, and weight management, Wald chi-square(5) = 11.14, $p = .049$, and Topic 8, concerning satiety-based diets, glycemic control, and breakfast management, Wald chi-square(4) = 13.91, $p = .008$.

Government accounts showed two predictive relationships with public attention: Topic 6, concerning obesity and disease risk, Wald chi-square(2) = 6.20, $p = .045$, and Topic 7, concerning meal sequencing and national obesity-control guidelines, Wald chi-square(5) = 34.32, $p < .001$. Topic 6 was the only topic for which two institutional actors, government and media, both met the exploratory threshold.

To assess the dynamics of these five relationships, we estimated generalized cumulative IRFs from the corresponding bivariate daily VARs. A 10% shock was defined as a one-time increase equal to 10% of the focal actor's mean topic share, and public responses are reported in percentage points over the following 10 days.

Three paths produced sustained positive cumulative responses. For organizational Topic 2, the response peaked on day 1 at 0.555 percentage points (95% CI [0.288, 0.861]) and remained 0.346 points on day 10 (95% CI [0.125, 0.633]). For organizational Topic 8, the response peaked on day 1 at 0.714 points (95% CI [0.304, 1.110]) and remained 0.414 points on day 10 (95% CI [0.149, 0.722]). For government Topic 7, the response peaked on day 2 at 0.237 points (95% CI [0.159, 0.322]) and

remained 0.124 points on day 10 (95% CI [0.075, 0.181]). Media and government shocks on Topic 6 produced short-term positive responses on day 1, but their day-10 confidence intervals included zero.

Taken together, the results indicate topic-specific functional differentiation. Government attention was associated with a sustained public response on a policy-guideline topic, media attention with a short-term response on disease risk, and organizational attention with sustained responses on two practical diet-management topics. Topic 6 showed limited overlap between government and media, but the evidence does not establish systematic synergistic coordination. Because the p-values were not adjusted for multiple testing, all five relationships should be treated as exploratory, with particular caution for Topic 2 and government Topic 6, whose p-values were close to .05.

Discussion

To the best of our knowledge, this is the first study to examine agenda-setting dynamics during China's national "Weight Management Year" campaign using time-series analysis of social media data. The findings extend obesity communication research by shifting attention from message dissemination alone to the temporal organization of public attention across different communication actors. Specifically, the study makes two contributions: (1) it reveals topic-specific and actor-differentiated temporal relationships between institutional attention and public attention to weight management, and (2) it provides an empirical basis for considering differentiated communication roles for government, media, and civil society organizations in national obesity-prevention campaigns. More broadly, the findings suggest that population-level health communication may depend not only on what information is communicated, but also on who communicates it, when it is introduced, and how long the resulting public attention can be sustained.

This study examines obesity communication as a societal process involving

government, media, organizational actors, and the public. This perspective is particularly relevant because obesity prevention requires not only individual behavior change but also broader institutional and social engagement, as identified by Wallack and Lawrence [29]. In the Chinese context, this multi-actor perspective also echoes the long-standing emphasis on collaborative governance [57-59]. Collaborative communication is therefore used here as an evaluative framework for examining whether differentiated agenda relationships indicate potential complementarity among actors.

The descriptive and time-series results reveal an important distinction between similarity in message content and differentiation in communication function. Government, media, and organizational accounts displayed broadly similar topic distributions, whereas public users devoted more attention to personal weight-loss experiences and health-related information. Functional differentiation became more visible in the temporal relationships between institutional and public attention. Government attention was associated with subsequent public attention to policy guidance and obesity-related disease risk, media attention with short-term attention to disease risk, and attention from civil society organizations with more sustained attention to practical dietary topics. These patterns suggest that different actors may perform distinct agenda functions even when they communicate about broadly similar issues.

The actor-specific patterns may reflect differences in communicative authority and social function. Government attention to Topic 7, concerning meal sequencing and national obesity-control guidelines, was followed by a positive public response lasting through day 10, suggesting that government communication may help anchor authoritative policy guidance and establish issue legitimacy. By contrast, media attention showed only a short-term relationship with disease-risk information, which may reflect the media's strength in rapidly amplifying salient or newsworthy health risks. Civil society organizations showed more sustained relationships with practical

diet-management topics, including intermittent fasting, dietary energy, satiety, glycemic control, and breakfast management. Because such topics are closely linked to everyday behavioral decisions, organizational communication may help translate broad public-health goals into more concrete and actionable guidance.

From a public health perspective, these findings suggest that weight-management campaigns may benefit from coordinated yet differentiated communication strategies. Government agencies may be particularly suited to establishing policy priorities and providing authoritative guidance, media organizations to increasing the visibility of health risks during critical periods, and civil society organizations to sustaining engagement with practical behavior-oriented recommendations. Communication planning should therefore consider not only message volume but also the timing and sequencing of communication. For example, authoritative policy communication may first establish an agenda, media coverage may increase short-term salience, and organizational communication may subsequently reinforce actionable health behaviors.

At the same time, the overall pattern of temporal relationships remained limited, and no consistent pattern of cross-actor complementarity was observed. This finding suggests that the presence of multiple communication actors does not necessarily produce collaborative communication. Similar topic distributions across institutional actors may instead indicate some duplication of communication efforts. Extending the collaborative communication perspective of Wei and Li [18], the present findings suggest that effective collaboration may require not only actor diversity but also functional differentiation, temporal coordination, and topic-specific allocation of communication responsibilities. Future research should test these possibilities using multimethod designs and examine whether such coordinated communication translates beyond public attention into knowledge, behavioral change, and health outcomes. The present study therefore provides an exploratory empirical foundation for understanding how multi-actor communication may be organized more effectively in national obesity-prevention campaigns.

Limitations

Several limitations should be acknowledged. First, the 112-day observation window and focus on Sina Weibo limit the generalizability of the findings across the full three-year campaign and other communication channels. Second, Granger causality indicates temporal prediction rather than true causation, and the use of an unadjusted $p < .05$ threshold across multiple tests may increase Type I error. Third, LDA topic modeling involves subjective decisions regarding preprocessing, topic number, and labeling. Fourth, actor classification based on Weibo verification may not fully capture account characteristics. Finally, post volume reflects public attention but not necessarily behavioral change or health outcomes.

Conclusion

In this study, we identified topic-specific and actor-differentiated agenda relationships during China's "Weight Management Year" campaign on Sina Weibo. Government attention was associated with sustained public attention to policy guidance, media attention with short-term public attention to disease risk, and attention from civil society organizations with sustained public attention to practical diet management. These findings suggest the potential value of clearer, actor-specific roles in national obesity-prevention communication, with government anchoring policy interpretation, media amplifying risk awareness at critical moments, and civil society organizations sustaining behavior-oriented engagement. When designing such campaigns, public health institutions should consider the timing, source, and content of messages jointly. In doing so, multi-actor health communication may become more than the sum of its parts.

Abbreviations

CDC: Center for Disease Control and Prevention

NGO: nongovernmental organization

UGC: user-generated content

Declarations

Ethics approval and consent to participate: Not applicable. All data were collected from publicly available posts on Sina Weibo in accordance with the platform's terms of service, and no personally identifiable information is reported.

Consent for publication: Not applicable.

Availability of data and materials: The datasets analyzed during the current study are available from the corresponding author on reasonable request.

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