Influence of Short Film Narrative Elements on Communication Effect of WHO Film Festival-A Case Study of Peking University Students

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Abstract: With the diversification of health communication formats in the digital media environment, short films have become an important vehicle for public health advocacy. Taking the World Health Organization's *Health for All Film Festival* as a case, this study examines how different narrative elements influence the communication effectiveness of health-related short films. Based on the cognition–affect–behavior (CAB) model, an experimental design was employed using 18 shortlisted films from the 2023 festival. Seventy-two Peking University students participated in pre-test and post-test surveys measuring changes in cognition, emotion, attitude, and behavior. The study comparatively analyzes six narrative elements: live-action versus animation, first-person versus third-person narration, and data-driven versus non-data-driven storytelling, across three health themes (psychological, sexual, and environmental health). The results indicate that live-action narratives primarily enhance cognitive outcomes, while animated storytelling more effectively promotes emotional and behavioral change. Both first-person and third-person narration exert positive effects across all four dimensions, and both data-driven and non-data-driven narratives contribute to cognitive and behavioral improvement. Overall, narrative elements significantly shape health communication outcomes, providing empirical evidence for optimizing the design of health communication short films.

Keywords: Health communication; Short films; Narrative elements; Communication effectiveness; WHO Health for All Film Festival

Introduction

With the continuous development of the social economy, people's material living standards have significantly improved, and health issues have increasingly received the common attention and emphasis of the whole society. General Secretary Xi Jinping emphasized in the report to the 20th National Congress of the Communist Party of China that we should "promote the construction of a healthy China" and "place the protection of people's health in a strategic position of priority development, and improve policies for promoting people's health." In a series of documents issued by the state, health communication has been highlighted, and the "Health Knowledge Popularization Campaign" has been listed as one of the 15 major special actions for building a healthy China.

With the development of the internet, the forms of health communication have gradually diversified. Among them, microfilms play a significant role in the field of health communication due to their concise and powerful nature, low cost, and flexible format. Since 2020, the World Health Organization (WHO) has annually organized the Health For All Film Festival, leveraging its influence in global health governance to demonstrate tremendous potential in public health advocacy worldwide. To date, the "Health For All" Film Festival has been held four times, receiving over 4,300 entries from 110 countries, covering topics ranging from anxiety and depression to the impact of climate change on health and the health challenges faced by people with disabilities. Among the shortlisted films, six films from different categories were

awarded, and three films received special jury nominations.

This study is based on the WHO Health Action Film Festival (HAFF) and the Social Science Research Project of the WHO Behavior Insights Unit, focusing on 18 shortlisted films from the 2023 HAFF. It explores the impact of narrative elements on the communication effectiveness of health communication microfilms and proposes feasible recommendations for the improvement and development of health communication microfilms.

Theory & Hypotheses

CAB model

The most widely adopted theory regarding the communication effects of science popularization videos is the Stainer-Ravitch Step Model, which describes the stepwise progression of communication effects. They posited that communication effects are generated through a series of sequential steps: awareness, understanding, liking, preference, belief, and purchase, where each step must be completed based on the previous one. Ravitch and Stainer categorized these six steps into three dimensions: cognition, attitude, and behavior. Cognition refers to the process by which people acquire knowledge through mental activities such as forming concepts, perceptions, or judgments; attitude denotes the psychological inclination toward a subject; while behavior represents the external actions driven by the attitude.(Robert, 1961)

Narrative elements

As of March 2024, a search on China National Knowledge Infrastructure (CNKI) using the keywords "health communication*microfilm" yielded a total of 5 articles: 2

in 2018,1 in 2021, and 2 in 2023, distributed across four disciplines: drama and film arts, medical and health policies and laws, psychology, and journalism and media (Wang et al., 2023; Zhang, 2009; Guo, 1999; Xu et al., 2005; Stern, 1998). From the above literature review, it is evident that microfilms, due to their broad reach and diversified dissemination methods, play a promoting role in health communication, aiding in the popularization of health knowledge and the advancement of health education. On the other hand, it is also apparent that current academic research on health communication microfilms is limited and lacks depth. Existing studies predominantly focus on case analyses, lacking in-depth exploration of the overall development trends and systematic characteristics of health communication microfilms. Research methods are mostly qualitative content analysis, with insufficient quantitative studies and audience surveys, limiting comprehensive evaluation of the communication effects of microfilms. There is scant attention to audience acceptance, feedback, and interactive behaviors, and insufficient research on optimizing microfilm content and formats based on audience needs. Most studies are theoretical in nature, lacking empirical support, and there is insufficient data to substantiate the role and effectiveness of microfilms in practical health communication.

Communication effect

The book "Principles of Communication" defines communication effects as: Generally speaking, communication effects refer to the influence exerted on the recipient's thoughts (including cognition, attitudes, emotions, etc.) and behaviors after

the information disseminated by communicators reaches the audience through specific channels (media).(Zhang, 2009) In Professor Guo Qingguang's "Communication Tutorial," two definitions of communication effects are proposed, one of which refers to the psychological, attitudinal, and behavioral changes induced in recipients by persuasive communication activities. (Guo, 1999) Therefore, it can be concluded that communication effects are closely related to recipients and must be concretely manifested through their reactions and changes. The currently widely accepted definition of communication effects encompasses all psychological states, attitude shifts, and behavioral changes triggered in recipients by persuasive communication behaviors, as well as the comprehensive impacts and outcomes generated by mass media activities and other communication practices on recipients and society as a whole.

Cartoon

In 2003, Mr.Li Zhongqiu, then a council member of the World Animation Society and executive secretary-general of the China Animation Society, proposed the concept of "Pan-animation" on the China Animation Network, extending animation as a dynamic graphic expression to all animation application fields. After this concept was proposed, with the development of science and technology, animation, as a creative industry, has achieved cross-border integration with many industries. In the Dictionary of Film Art (Revised Edition), the definition of popular science animation is: "Refers generally to animation films that disseminate popular science knowledge, with story content mainly focused on popularizing scientific knowledge, including

series and promotional short films." (Xu et al., 2005)

Among the 93 award-winning films selected for the 2023 WHO "Health for All" Film Festival, 18 incorporated animation elements. Specifically, 3 films addressed mental health, 1 focused on sexual health, and 5 explored environmental health. While all these films utilized animation as a medium, their implementation varied significantly. Based on production techniques, animation is primarily categorized into five types: traditional animation, vector animation, 3D animation, motion graphics, and stop-motion animation. Overall, the award-winning films predominantly featured traditional animation, motion graphics, and stop-motion animation, with the first two categories being the most prevalent.

The advantages of live-action short films and the limitations of animated films are largely relative. Live-action filming captures authentic experimental phenomena, natural landscapes, and social practices, enhancing the credibility and authority of science communication content. Additionally, real-life scenarios and solutions presented through live-action footage resonate with audiences by reflecting everyday experiences. Furthermore, live-action productions leverage existing resources like laboratories and field environments, resulting in relatively lower production costs. In contrast, animated films face challenges including higher production costs, significant time and financial investments — especially for high-quality 3D animations — and potential skepticism from audiences regarding the perceived lack of realism. Moreover, animations may be perceived as "simplistic" by younger audiences. Taking live-action experimental films as an example, feedback from experimental results

highlights two main weaknesses: first, the films often exhibit excessive performance traces; second, content design may lack coherence in terms of logic, pacing, and scientific accuracy.

Based on the above description, the following research hypothesis is proposed regarding the impact of the first pair of independent variables on the communication effectiveness of health-related science popularization microfilms:

H1a: Live-action storytelling positively influences audience cognition after viewing science popularization microfilms.

H1b: Real-life storytelling positively influences audience emotional responses after watching science popularization microfilms.

H1c: Live-action storytelling positively influences audience attitudes toward science popularization microfilms.

H1d: Live-action storytelling positively influences audience behavior changes after watching science popularization microfilms.

H2a: Animated storytelling positively influences audience cognition after viewing science popularization microfilms.

H2b: Animated storytelling positively influences audience emotional responses after viewing science popularization microfilms.

H2c: Animated storytelling positively influences audience attitudes after watching science popularization microfilms.

H2d: Animated storytelling positively influences audience behavior changes after watching science popularization microfilms.

Person

Narrative serves as a fundamental strategy for humans to interpret the world and an essential tool for creating and communicating in daily life. (Stern, 1998) The narrative perspective (Point of View, POV) is a crucial element of storytelling, guiding readers to engage with, interpret, and comprehend the narrative. (Chen & Bell, 2021) Among narrative perspectives, first-person and third-person perspectives are the most prevalent. First-person narration recounts stories from the "I" or "we" viewpoint, offering audiences a more subjective experience and fostering empathy with the characters. Third-person narration, conversely, describes others' experiences through "he," "she," or "they," creating a sense of distance between the audience and the story while providing a more objective perspective. (Fu & Yu, 2022)

First-person narration offers two key advantages: Firstly, by adopting the 'I' perspective, it creates an immersive experience that helps audiences intuitively grasp health-related concepts. Secondly, it vividly portrays the narrator's emotional responses and psychological shifts, fostering emotional resonance with health-related issues and enhancing long-term memory retention.

The advantages of third-person narration can be summarized in two key aspects: First, it allows for a comprehensive perspective in presenting scientific knowledge objectively and impartially, avoiding narrow viewpoints while offering a broader view of multiple research directions, theories, and experimental results. Second, this narrative approach facilitates the inclusion of expert interviews, data charts, and authoritative materials, incorporating diverse scientific perspectives to enrich the

depth and complexity of science communication. However, compared to first-person narration, third-person storytelling may lack the immediate emotional connection and intimacy that viewers might expect, potentially making it harder to instantly engage audiences emotionally with scientific content. Additionally, without a fixed first-person narrator to guide the narrative flow, science films may require extra design elements to maintain pacing and audience engagement. Furthermore, when conveying abstract and complex scientific concepts, third-person narration often falls short of first-person storytelling in terms of clarity and relatability, necessitating the use of visual aids and vivid metaphors to compensate for this limitation.

Based on the above description, we formulate the following research hypothesis regarding the impact of the second pair of independent variables on the communication effectiveness of health-themed science popularization microfilms:

H3a: First-person narration positively influences audience cognition after viewing science popularization microfilms.

H3b: First-person narration positively influences audience emotional responses after watching science popularization microfilms.

H3c: First-person narration positively influences audience attitudes toward science popularization microfilms.

H3d: First-person narration positively influences audience behavior changes after watching science popularization microfilms.

H4a: Third-person narration positively influences audience cognition after viewing science popularization microfilms.

H4b: Third-person narration positively influences audience emotional responses after watching science popularization microfilms.

H4c: Third-person narration positively influences audience attitudes toward science popularization microfilms.

H4d: Third-person narration positively influences audience behavior changes after watching science popularization microfilms.

Data

Scientific data and references form the solid foundation for knowledge dissemination and problem analysis in science popularization micro-videos. When creating such videos, citing scientific data serves as a fundamental element to ensure accurate knowledge presentation. Moreover, this approach effectively enhances the authority and credibility of the content, much like citing classical literature in academic discourse. Both methods achieve comparable effects in strengthening the persuasiveness of arguments.

The strength of science films without data lies in their artistic appeal and storytelling power. Through captivating narratives and visual storytelling, these films engage audiences in a more intuitive and emotionally resonant way. They focus on plot development and character building, connecting scientific concepts to everyday life to enhance information accessibility and memorability. Moreover, artistic approaches stimulate viewers' imagination and creativity, allowing them to gain deeper insights into scientific knowledge while enjoying the visual and auditory feast.

Based on the above description, the following research hypothesis is proposed

regarding the impact of the third independent variable on the communication effectiveness of health-themed science popularization microfilms:

H5a: Data-driven storytelling positively influences audience cognition after viewing science popularization microfilms.

H5b: Data-driven storytelling positively influences audience emotional responses after watching science popularization microfilms.

H5c: Data-driven storytelling positively influences audience attitudes after watching science popularization microfilms.

H5d: Data-driven storytelling positively influences audience behavior after watching science popularization microfilms.

H6a: Narrative without data positively influences audience cognition after watching science popularization microfilms.

H6b: Narrative without data positively influences audience's emotional response after watching science popularization microfilms.

H6c: Narrative without data positively influences audience attitudes after watching science popularization microfilms.

H6d: Narrative without data positively influences audience behavior changes after watching science popularization microfilms.

Furthermore, based on the questionnaire data from the pre-test, participants demonstrated varying preferences for different themes and narrative elements. Therefore, this study proposes the following hypothesis:

H7: Different themes elicit distinct cognitive, emotional, attitudinal, and

behavioral responses in audiences after viewing science popularization microfilms.

H8: Different elements influence viewers' cognition, emotions, attitudes, and behaviors after watching science popularization microfilms.

Method

Study subjects and Samples

The WHO "Health for All" Film Festival has demonstrated significant potential in global public health advocacy. The fourth edition, held in April 2023, featured nearly 300 films addressing global health challenges, with 93 films shortlisted across six categories ranging from anxiety and depression to climate change impacts on health and health challenges faced by people with disabilities. This study selected three themes — psychological, sexual, and environmental health — and employed three narrative elements: first-person, animation, and data-driven storytelling. Three control groups were established under each theme, combining six elements: first-person versus third-person narration, data-driven versus non-data-driven narratives, and live-action versus animated storytelling. One film was chosen for each element per theme, resulting in a total of 18 selected films.

Guinea-pig

（1）In this study, we selected three themes: psychological, sexual, and environmental health. We chose first-person/third-person perspectives, animated/real-shot filming styles, and data availability as influencing factors. Under each theme, we established three control groups by combining six elements and selected one film for each group, totaling 18 films.

（2）The downloaded video is processed with machine translation.

（3）The online questionnaire consists of 14 items, including 1 registration and basic information form, 1 pre-experiment movie preference survey, and 12 control questionnaires (1 pre-test and 1 post-test for each of the 6 narrative elements).

This study enrolled 76 Peking University students from various departments, aged 18-26, primarily undergraduates, with 72 participants ultimately completing the experiment. Prior to the experiment, each participant completed a pre-experiment questionnaire assessing their film preferences (Table 2-1). To minimize bias from personal preferences, the research team assigned films to participants based on their preferences and established control groups. Each participant watched one microfilm per element under a specific theme. To protect participant privacy, all data was anonymized by element and experiment sequence, with all participant information in this paper being coded.

Table 2-1. Statistical results of pre-experiment questionnaires (Source: Author's own compilation)

First indicator	Second indicator	number of people
Animation preferences	Partial animation	11
	Partial live-action	41
	No preference	20
Data preferences	Data included	31
	Simple narration	21
	No preference	20
Person preference	First person	16
	Third person	31
	No preference	25

Variables and Measurement

After identifying the three core themes—psychology, sexuality, and environment—and conducting a comprehensive analysis of all shortlisted films, we selected narrative elements with high frequency and distinct characteristics: animation, first-person narration, and data. Under each theme, we established three comparative groups (animation vs. live-action, first-person vs. third-person, data-driven vs. data-free) by incorporating six elements. One film was chosen for each group, resulting in a total of 18 films (see Appendix). The following sections will provide detailed analyses of these three narrative element groups.

Experimental design and Procedure

This study recruited 72 participants based on the measurement indicators, dividing them into 18 groups of 4 each. Each group was assigned one film from the 18 selected films, and participants viewed their assigned film while completing pretest and posttest questionnaires corresponding to the film's elements. A total of 216 questionnaires were collected. After administering the pretest and posttest, the data were analyzed to observe differences between the pre-and post-test conditions. Statistical analysis was performed using SPSS27.0 and AMOS 25.0, including demographic analysis, reliability and validity testing, and inter-variable difference analysis, to validate the research hypotheses and draw conclusions.

Results

72 subjects aged between 18 and 26 years, predominantly undergraduates, with males accounting for 26% and females for 74%. A total of 72 questionnaires were

distributed for pre-experiment, pre-test, and post-test, with 936 questionnaires recovered.

Sample description

This study first investigated participants' awareness of the WHO Health for All Film Festival, with statistical results presented in Table 3-1. The findings indicate that all participants had viewed science popularization short videos, 82% occasionally watched them, 22% had never seen science popularization microfilms, 36% actively searched for and watched them, and 86% had never heard of the WHO Health for All Film Festival.

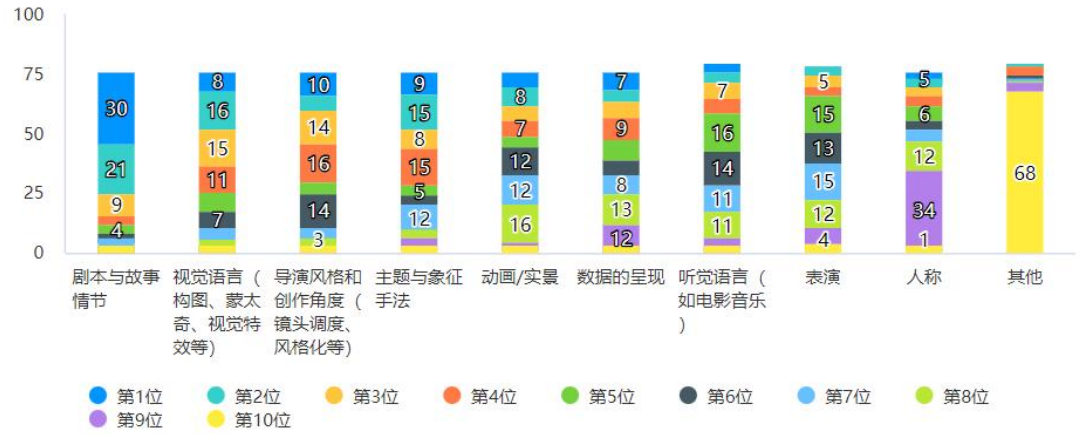
Table 3-1. Statistical Results of Participants' Cognition of Film Festival

Variable	Option	Frequency	Percentage
Frequency of watching health education short videos	Watch often	13	18%
	Watch occasionally	59	82%
	Never seen	0	0%
Frequency of watching health education microfilms	Watch often	5	7%
	Watch occasionally	51	71%
	Never seen	16	22%
Reasons for watching health education videos or microfilms	I accidentally clicked on it.	63	47%
	Related to your own (or family members') health status, actively search	31	23%
	I'm interested in this and searched actively	17	13%
	Shared or recommended by others	23	17%
Understanding of the WHO Health for All Film Festival	Never heard of it	62	86%
	I heard about it, but I don't know	8	11%
	I have a basic understanding, but I have never watched any of the films.	2	3%

Furthermore, the research team surveyed participants on elements they identified as influencing communication effectiveness, with the statistical results presented in Table 3-2. The composite scores were calculated using the formula: (Σ frequency $\times$

weight) / number of responses. The scores, ranked from highest to lowest, were: script and storyline, visual language, directorial style and creative perspective, theme and symbolic techniques, animation versus live-action, data presentation, auditory language, performance, and personal perspective.

Table 3-2. Element Influence Statistical Chart



Reliability analysis

The reliability of the questionnaire was tested by using SPSS27.0 data analysis software.

Reliability Analysis of Three-Pair Elements in the Pre-test Questionnaire

The pre-test questionnaire incorporating live-action/animation elements achieved an overall Cronbach's Alpha coefficient of 0.693, indicating satisfactory reliability. The version with data/non-data elements showed a 0.621 coefficient, meeting the standard. However, the first-person/third-person version's coefficient dipped below 0.6, suggesting lower reliability—a likely consequence of the limited sample size in this study.

After removing certain items based on reliability analysis, we conducted

reliability analysis on the remaining variables in the post-test questionnaire. The post-test questionnaire based on live-action/animation elements achieved an overall Cronbach's Alpha coefficient of 0.791, indicating a high reliability level. The version using person element elements showed a Cronbach's Alpha coefficient of 0.908, demonstrating exceptionally high reliability. The data element version recorded a Cronbach's Alpha coefficient of 0.891, indicating a moderately high reliability level. All three pairs of element-based post-test questionnaires exhibited very high reliability levels for their remaining variables, confirming strong reliability.

Analysis of validity

This part mainly uses the AMOS25.0's confirmatory factor analysis function to test the validity.

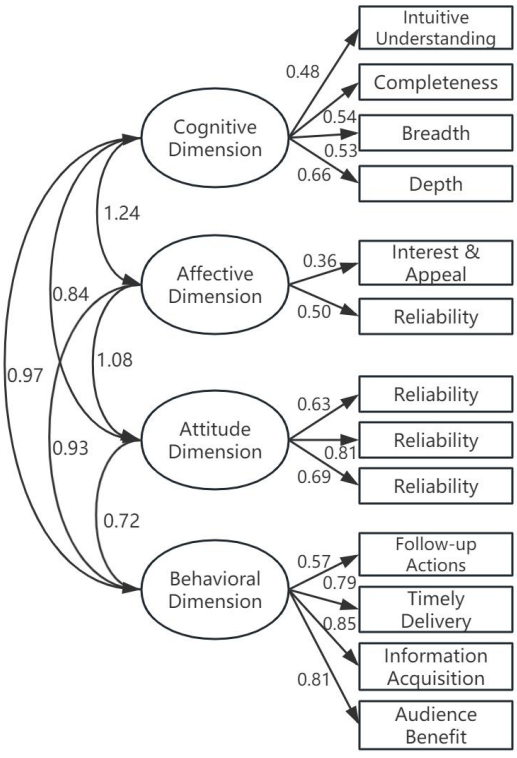


Figure 1. Correlation of Dependent Variables

The CMIN/DF ratio was 1.936, which is below 3. Although the RMSEA value was 0.115 (larger than 0.08), this may be attributed to the limited dataset, and its

limitations will be discussed in subsequent sections. The GFI score reached 0.815 (above 0.8), while the CFI and TLI values both exceeded 0.8. (Zhang et al., 2007) Overall, the model demonstrates good fit validity.

The factor loadings of the four dimensions — cognition, emotion, attitude, and behavior — exceed 0.6 or approach this threshold for most items, indicating their representativeness. However, the average variance (AVE) across these dimensions rarely reaches 0.5, and the composite reliability (CR) seldom exceeds 0.8, suggesting suboptimal validity.

Table 3-3. Discrimination Validity

Dimension	Cognition	Feeling	Manner	Action
Cognition	0.556	-	-	-
Feeling	0.153	0.432	-	-
Manner	0.178	0.179	0.659	-
Action	0.194	0.146	0.194	0.762
AVE	0.309	0.187	0.434	0.581

The square root of the AVE value in all four dimensions is greater than the correlation coefficient between that dimension and the others, indicating that the scale has good discriminant validity(Liu et al., 2008).

Analysis of Variance

Live-action vs. Animation Comparison

Table 3-4. Analysis of the differences between the actual photos and animation elements in each dimension of the pre-test questionnaire

Dimension	Element	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Live-action	12	4.33	1.497	0.781	0.443
	Animation	12	3.92	1.084		
Feeling	Live-action	12	4.92	1.311	1.065	0.298

	Animation	12	4.33	1.371		
Manner	Live-action	12	4.00	1.414	-2.402	0.025
	Animation	12	5.33	1.303		
	Live-action	12	2.42	0.515		
Action	Animation	12	2.92	0.515	-2.378	0.026

As shown in Table 3-4, the subjects did not show significant differences in the cognition and emotion dimensions between the real photos and the animation elements in the pre-test, but the differences were significant in the attitude and behavior dimensions.

Table 3-5. Analysis of the differences between the actual photos and animation elements in each dimension of the post-test questionnaire

Dimension	Element	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Live-action	12	9.42	3.118	0.972	0.342
	Animation	12	8.42	1.73		
Feeling	Live-action	12	4.17	1.403	0.132	0.896
	Animation	12	4.08	1.676		
Manner	Live-action	12	7.17	1.899	-1.107	0.280
	Animation	12	7.92	1.379		
Action	Live-action	12	10.08	3.232	1.748	0.099
	Animation	12	8.25	1.658		

As shown in Table 3-5, there were no significant differences in the dimensions of cognition, emotion, attitude and behavior between the subjects' responses to the real

photos and the animation elements in the post-test.

First-person vs. Third-person Comparison

Table 3-6. Analysis of the differences between the first-person and third-person elements in each dimension of the pre-test questionnaire

Dimension	Element	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	First person	12	2.5	0.674	0.616	0.544
	Third person	12	2.33	0.651		
Feeling	First person	12	4.33	1.073	0.618	0.543
	Third person	12	4.08	0.9		
Manner	First person	12	6.25	1.138	1.956	0.063
	Third person	12	5.25	1.357		
Action	First person	12	2	0.603	-2.152	0.043
	Third person	12	2.67	0.888		

As shown in Table 3-6, the subjects did not show significant differences in the cognitive, affective and attitudinal dimensions between the first and third person elements in the pre-test, but the differences were significant in the behavioral dimension.

Table 3-7. Analysis of the differences of each dimension in the first person and third person elements in the post-test questionnaire

Dimension	Element	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	First person	11	8.91	2.737	-0.292	0.773
	Third person	13	9.23	2.651		
Feeling	First person	11	3.36	0.809	-1.294	0.209
	Third person	13	3.85	0.987		
Manner	First person	11	7.64	2.335	1.370	0.185
	Third person	13	6.31	2.394		
Action	First person	11	8.18	2.639	-0.431	0.671
	Third person	13	8.77	3.811		

As shown in Table 3-7, there was no significant difference in the cognitive, affective, attitudinal and behavioral dimensions between the first-person and third-person elements in the post-test.

Data vs. No Data Comparison Results

Table 3-8. Analysis of differences between dimensions with and without data elements of the pre-test questionnaire

Dimension	Element	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Data available	12	3.75	0.754	-3.120	0.005
	No data	12	4.83	0.937		
Feeling	Data available	12	2.17	0.389	0.373	0.713
	No data	12	2.08	0.669		
Manner	Data available	12	2.08	0.669	-2.111	0.046
	No data	12	2.75	0.866		
Action	Data available	12	2.08	0.669	/	/
	No data	12	2.08	0.669		

As shown in Table 3-8, the pre-test showed no significant difference in the emotional dimension between the subjects with data and those without data, but there was a significant difference in the cognitive and attitude dimensions.

Table 3-9. Analysis of Differences in Post-test Dimensions Between Groups with and Without Data Elements

Dimension	Element	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Data available	12	8.83	2.082	-0.513	0.613
	No data	12	9.42	3.343		
Feeling	Data available	12	4	1.128	-0.771	0.449
	No data	12	4.33	0.985		
Manner	Data available	12	5.67	1.557	-1.492	0.150
	No data	12	6.67	1.723		
Action	Data available	12	9.42	3.315	-0.644	0.526
	No data	12	10.25	3.019		

As shown in Table 3-9, the post-test revealed no significant differences between the data-containing and data-free elements across the four dimensions.

The Before-and-After Test of Watching the Elements Microfilm

Table 3-10. Comparative Analysis of Real-World Elements Before and After Testing

Variable	Forward and Backward testing	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Before measurement	12	7.25	2.179	0.252	0.804
	Aftertest	12	7	2.663		
Feeling	Before measurement	12	4.17	1.337	-0.124	0.903
	Aftertest	12	4.25	1.913		
Manner	Before measurement	12	4.25	1.055	-1.326	0.199
	Aftertest	12	5	1.651		
Action	Before measurement	12	2.42	0.793	/	/
	Aftertest	12	2.42	0.793		

As shown in Table 3-10, the overall differences between the pre-and post-tests across the four dimensions are not statistically significant.

The Comparison of the Pre-test and Post-test of Animation Elements Micro-film

Table 3-11. Comparative Analysis of Animation Elements Before and After Testing

Dimension	Forward and Backward testing	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Before measurement	12	5.58	1.379	-0.221	0.827
	Aftertest	12	5.75	2.221		
Feeling	Before measurement	12	5.42	1.929	1.255	0.223
	Aftertest	12	4.42	1.975		
Manner	Before measureme	12	5.5	1	-0.205	0.840

	nt					
	Aftertest	12	5.58	0.996		
Action	Before measurement	12	2.33	0.492	2.760	0.011
	Aftertest	12	1.83	0.389		

As shown in Table 3-11, among the four dimensions, only the behavioral dimension showed significant differences between the pre-and post-tests.

The Pre-test and Post-test Comparison of the First-person Element Micro-film

Table 3-12. Pre-test and Post-test Comparative Analysis of First-person Elements

Variable	Forward and Backward testing	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Before measurement	12	2.5	0.674	0.886	0.385
	Aftertest	12	2.17	1.115		
Feeling	Before measurement	12	4.334	1.073	3.099	0.005
	Aftertest	12	2.92	1.165		
Manner	Before measurement	12	6.25	1.138	2.077	0.050
	Aftertest	12	5.17	1.403		
Action	Before measurement	12	2	0.603	1	0.328
	Aftertest	12	1.75	0.622		

As shown in Table 3-12, except for the emotional dimension, the differences in the other three dimensions between the pre-and post-tests were not significant.

The Contrast of the Third Person Element Micro Film before and after Test

Table 3-13. Comparative Analysis of Third-Person Elements Before and After Testing

Dimension	Forward and Backward testing	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognitio	Before	12	2.33	0.651	0.833	0.413

n	measurement					
	Aftertest	12	2.08	0.862		
Feeling	Before measurement	12	2.08	0.515	0.380	0.708
	Aftertest	12	2	0.577		
Manner	Before measurement	12	5.25	1.357	1.682	0.106
	Aftertest	12	4.31	1.437		
Action	Before measurement	12	2.67	0.888	-0.055	0.957
	Aftertest	12	2.66	1.377		

As shown in Table 3-13, the differences between the pre-and post-tests across the four dimensions are not significant.

A Before-and-After Test of Watching Data Elements Microfilm

Table 3-14. Pre-Post Test Comparison Analysis of Data Elements

Dimension	Forward and Backward testing	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Before measurement	12	3.75	0.754	0.492	0.628
	Aftertest	12	3.58	0.9		
Feeling	Before measurement	12	2.17	0.389	1.254	0.229
	Aftertest	12	1.83	0.835		
Manner	Before measurement	12	2.08	0.669	-0.251	0.804
	Aftertest	12	2.17	0.937		
Action	Before measurement	12	5	0.426	0.290	0.776
	Aftertest	12	4.92	0.9		

As shown in Table 3-14, the differences between the pre-and post-tests across the

four dimensions are not significant.

A before-and-after test of watching microfilms with no data elements

Table 3-15. Pre-Post Test Comparison Analysis Without Data Elements

Variable	Forward and Backward testing	Number of cases	Average value	Standard error	t price	Conspicuousness
Cognition	Before measurement	12	5.33	1.614	0.648	0.524
	Aftertest	12	4.92	1.553		
Feeling	Before measurement	12	2.08	0.669	-1.042	0.308
	Aftertest	12	2.38	0.768		
Manner	Before measurement	12	3.08	0.996	2.913	0.008
	Aftertest	12	2.15	0.555		
Action	Before measurement	12	2.83	0.835	0.445	0.661
	Aftertest	12	2.69	0.751		

As shown in Table 3-15, the attitude dimension demonstrates significant differences between pre-and post-tests, while the other three dimensions show less significant changes.

Theme effect difference

Table 3-16. Results of the analysis of the differences of each dimension in the theme of the post-test questionnaire

Dimension	Theme	Number of terms	Average value	Standard error	F	Conspicuousness	Multiple comparisons
Cognition	Psychology	24	9.04	2.678	0.297	0.744	/
	Nature	24	8.75	2.609			
	Environment	24	9.33	2.582			

	Psychology	24	3.83	1.204			
Feeling	Nature	24	4.17	1.09	0.496	0.611	/
	Environment	24	3.92	1.316			
	Psychology	24	6.67	1.926			
Manner	Nature	24	7.21	2.322	0.5	0.609	/
	Environment	24	6.75	1.775			
	Psychology	24	8.71	2.866			
Action	Nature	24	8.92	2.977	1.003	0.372	/
	Environment	24	9.88	3.275			

In the post-test questionnaire of six elements, there was no significant difference in the popular science effect of four dimensions in the three themes of psychology, sex and environment.

Discussion

Main findings

This study tested the proposed hypotheses through experimental data analysis. Except for Hypothesis H6a (positive effect of animated narratives on cognitive change), H5b (positive effect of live-action narratives on emotional change), H5c (positive effect of live-action narratives on attitude change), H6c (positive effect of animated narratives on attitude change), H3c (positive effect of data-driven narratives on attitude change), and H4b (positive effect of non-data-driven narratives on emotional change), all other hypotheses were supported by the experimental results.

Table 4-1. Hypothesis Verification 1 for the Research on the Communication Effect of Health Science Popularization Microfilms

	Influencing	Research hypothesis	Verification

factor			result
	Live element	H5a	found
	Animation element	H6a	False
Cognitive dimension	First-person element	H1a	Found
	Third-person element	H2a	Found
	Data element	H3a	Found
	No data element	H4a	Found
	Live element	H5b	False
	Animation element	H6b	Found
Emotional dimension	First-person element	H1b	Found
	Third-person element	H2b	Found
	Data element	H3b	Found
	No data element	H4b	False
	Live element	H5c	False
	Animation element	H6c	False
Attitude dimension	First-person element	H1a	Found
	Third-person element	H2c	Found
	Data element	H3c	False
	No data element	H4c	Found
	Live element	H5d	False
	Animation element	H6d	Found
Behavioral dimension	First-person element	H1d	Found
	Third-person element	H2d	Found
	Data element	H3d	Found
	No data element	H4d	Found

Table 4-2. Hypothesis Verification 2: Research on the Communication Effect of Health Science Popularization Microfilms

Research hypothesis	Verification result
H7	Found
H8	Found

research conclusion

The real shooting narrative only has a positive effect on the audience's cognitive change after watching the health science micro-film.

The live-action narrative approach only positively influenced audience cognition after viewing health-themed microfilms, while showing no significant impact on emotional, attitudinal, or behavioral changes. This effect is closely related to the characteristics of live-action microfilms, which can capture more authentic experimental phenomena and natural landscapes. To some extent, this enhances the credibility and authority of science communication content, which is beneficial for changing audience cognition.

Animation narrative has a positive effect on the audience's emotional and behavioral changes after watching health science popularization micro-films.

Animated storytelling positively influences audience emotional and behavioral changes after viewing health-themed microfilms, while cognitive and attitudinal shifts remain relatively unaffected. Participants reported that the animated format enhances their comprehension of science content and leaves a more lasting impression of the film's message. Although animated microfilms lack the credibility and authority of live-action counterparts, their unique appeal makes them appealing to young

audiences, who are more willing to pay for these films and delve deeper into related scientific knowledge.

First-person and third-person narration have positive effects on the audience's cognition, emotion, attitude and behavior change after watching health science popularization micro-films.

First-person and third-person narratives positively influence audience cognition, emotions, attitudes, and behavioral changes after viewing health-related science popularization microfilms. On one hand, first-person narration typically presents content through the 'I' perspective, providing viewers with a sense of personal involvement that facilitates more intuitive understanding and perception of health-related phenomena or principles. On the other hand, first-person narration can showcase the narrator's emotional responses and psychological changes, helping to evoke emotional resonance with health-related issues, thereby deepening impressions and memories.

Unlike first-person narratives, third-person storytelling offers a panoramic perspective that presents scientific knowledge objectively and impartially. It transcends singular viewpoints, comprehensively showcasing diverse research directions, theories, and experimental outcomes. This narrative approach facilitates the inclusion of expert interviews, data charts, and authoritative references, while incorporating multiple scientists' perspectives and research findings to enrich the depth and complexity of science communication. Although it may lack direct emotional engagement, its objective and balanced presentation remains convincing to

audiences. Thus, both first-person and third-person narratives possess unique, irreplaceable strengths that effectively drive positive shifts in audience cognition and behavior.

The data and non-data narrative have positive effects on the audience's cognition and behavior change after watching health science popularization micro-films.

Both data-driven and non-data-driven narratives positively influence audience cognition and behavioral changes after viewing health-themed science popularization microfilms. In science films, the integration of data typically enhances information accuracy and persuasiveness, though its effectiveness depends on data integration and presentation methods. Intuitive, synchronized, and explanatory data help audiences quickly grasp key information, while high-quality graphic design and visualization techniques improve content comprehension. Supported by compelling and intuitive data, audiences' cognition shifts and they are more likely to translate this into behavioral changes. While non-data-driven microfilms may lack the strong persuasiveness of data-driven ones, they excel in artistic storytelling and narrative techniques. Through engaging narratives and visual artistry, they connect scientific concepts with audience life experiences, thereby enhancing information acceptability and memorability, ultimately achieving positive cognitive and behavioral transformations.

Different elements will have different effects on the audience's cognition, emotion, attitude and behavior after watching health science popularization micro-film.

The analysis reveals that six narrative elements demonstrate varying degrees of

influence on audience cognition, emotions, attitudes, and behavioral changes after viewing health-themed science popularization microfilms. Specifically, live-action narration positively impacts cognitive changes, while animation narration enhances emotional and behavioral responses. Both first-person and third-person narratives show positive effects on all four dimensions, and both data-driven and non-data-driven narration contribute to cognitive and behavioral improvements. These outcomes are closely tied to each element's unique characteristics, which differ across various types, thus explaining the observed variations in their effectiveness.

Furthermore, the analysis revealed that while animated narratives demonstrated diminished effectiveness in shaping attitudes, they ultimately achieved better behavioral outcomes. Compared to live-action storytelling, animated narratives better align with young audiences 'preferences in terms of entertainment value and comprehension, giving them a distinct edge in science communication. Notably, although both first-person and third-person narratives positively influenced viewers' cognitive, emotional, attitudinal, and behavioral changes after watching health-themed microfilms, pre-and post-test data analysis showed first-person narratives consistently outperformed third-person narratives in behavioral impact. This indicates that while both narrative styles positively affect audience behavior, first-person narratives exhibit more pronounced and impactful effects. Finally, while both data-driven and non-data-driven narratives positively influenced viewers' cognitive and behavioral changes, post-test data analysis revealed that data-driven narratives produced significantly more pronounced effects across all dimensions—

cognitive, emotional, attitudinal, and behavioral — compared to non-data-driven narratives.

Different themes will have different effects on the audience's cognition, emotion, attitude and behavior after watching the science popularization micro-film.

While investigating how different narrative elements influence the communication effectiveness of health-themed science popularization microfilms, this study also compared pre-and post-test data across experimental themes. Analysis revealed that psychological themes demonstrated relatively lower average scores in emotional, attitudinal, and behavioral dimensions, yet exhibited superior communication effects compared to sexual and environmental themes. Post-analysis of psychological-themed microfilms, it becomes evident that these films are more comprehensible than the other two themes. On one hand, the deliberate use of black-and-white color schemes to represent mental health issues may facilitate audience understanding of the content. On the other hand, psychological issues have become a highly discussed topic in contemporary society, particularly resonating with younger audiences. Viewers may already possess basic knowledge about mental health, and their personal psychological concerns or curiosity may drive them to engage more actively with psychological-themed microfilms. Consequently, psychological themes demonstrated relatively stronger effects across all four dimensions. However, overall, the communication effectiveness of the three themes showed no significant differences. This indicates that while different themes do influence audience cognition, emotions, attitudes, and behaviors after watching

science popularization microfilms, the resulting impacts remain extremely limited.

Practical Significance

The Enlightenment of Animation and Live-action Elements in Micro-films

In recent years, the Party and the state have increasingly prioritized science popularization and innovation culture development. The government has proposed vigorously promoting the application of new technologies and formats like "Internet + Science Popularization" based on mobile internet, including new media and self-media, while gradually enhancing original capabilities in science popularization films and animations. To summarize, animation is not constrained by time, space, or location, which directly enables the visualization of complex scientific principles and abstract concepts through highly condensed, simplified, exaggerated, and anthropomorphic techniques. (Hao, 2013) It can vividly present content that is difficult or impossible to capture with conventional filming methods. Meanwhile, live-action films possess unique advantages in bridging audiences and enhancing credibility. Therefore, after analyzing the current shortcomings of both animation and live-action science popularization films, we propose recommendations to leverage their respective strengths while addressing weaknesses, thereby better serving the cause of science popularization.

The diversity and novelty of thematic expression have become increasingly important. While some viewers noted "content similarities" after watching the film, many expressed that "the topic was innovative and presented perspectives they had never considered before." This reflects a common issue in current science

communication videos: excessive homogeneity in narrative themes, plot structures, and visual elements. Such formulaic production inevitably weakens the thematic impact. To address this, science communicators must closely observe societal trends, identify emerging public health challenges, and remain committed to advancing social and health initiatives.

The plot should be realistic and logically coherent. As previously noted, the authenticity and coherence of a film are key factors influencing its science communication effectiveness. Medical health educators should ensure that the overall narrative aligns with basic common sense and logical flow during content creation, avoiding excessive artistic embellishment. Additionally, these films often lack "support from authoritative sources." This may be related to the participants' status as college students, as many subjects mentioned that the "data sources for these films are unclear."

Enhancing artistic quality and interactive engagement. Overall, these films have made efforts to elevate artistic standards, showcasing creators' ingenuity in visual aesthetics and design. However, they all overlook interactive elements, leaving audiences with limited opportunities to engage actively. Interactive science communication can stimulate sensory perception and encourage proactive knowledge acquisition. Both animated and live-action films should prioritize interactive features in future productions.

The Enlightenment of First Person and Third Person Elements in Microfilm

Based on participant feedback and the aforementioned analysis, this study

proposes three key narrative strategies for science popularization films. First, integrate multiple perspectives by combining first-person and third-person narration. Participant feedback clearly indicates that relying solely on either perspective fails to fully meet audience expectations. The recommended "multi-perspective approach blending first-person and third-person narration" effectively enhances educational impact, bridging the gap with viewers while ensuring content comprehensiveness and objectivity. Second, strategically incorporate expert interviews. When using third-person narration, timely integration of expert commentary as authoritative narration not only boosts credibility but also enriches the narrative with diverse viewpoints. Third, emphasize plot design and emotional engagement. Even third-person narratives can embed scientific knowledge through carefully crafted storylines, using emotional storytelling to draw audiences in—such as highlighting the human stories behind scientists' groundbreaking journeys or major discoveries.

The Enlightenment of Data and Non-data Elements in Micro-films

The analysis reveals that both inclusion and omission of data in science films present distinct advantages and limitations. Future productions should strike a balance between data presentation and narrative artistry, combining their strengths to create educational content that is both scientifically rigorous and engaging. Special attention should be given to data visualization techniques: using bar charts, pie charts, and line graphs to demonstrate comparisons, trends, and distributions; employing visualizations of temporal changes to illustrate historical trajectories or project progress; employing color variations to indicate data magnitude or density,

particularly for highlighting hotspots in climate or statistical data; utilizing animation effects to present dynamic data changes for enhanced comprehension; and showcasing parallel comparisons of datasets or data points across time to emphasize differences and similarities.

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Appendix

Theme	Animation/Live-action	Film title	The film's main content
Psychology	Cartoon	Gasping for Life	The film, told from a first-person perspective, depicts the profound impact of social media on adolescents' mental health, urging the public to properly recognize and prioritize mental health issues affecting every individual.
	Outdoor scene	Me Too	The film focuses on the mental health issues of adolescents, urging parents to pay attention to their mental well-being and seek professional treatment as early as possible.
Nature	Cartoon	When climate change turns violent	The film depicts gender-based violence against women caused by climate change, and calls for advocating for women's rights and freedoms through climate change awareness campaigns.
	Live-action	Vulvo and Dynia	The film depicts the pain that sexual intercourse and gynecological examinations bring to women, emphasizing that this should not become a shackle binding women, and that women have a legitimate right to this.
Environment	Cartoon	Brent gets wilder, Protecting our	The film points out that the natural environment and resources are the

		natural heritage	important natural heritage of human beings, and the importance of environmental and resource protection should be raised.
	Live-action	Freedom to breathe - children call for their right to clean air	The film centers on the Freedom to Breathe Campaign, advocating for clean air for children.

Theme	First person/Third person	Film title	The film's main content
Psychology	First person	Break the Silence	The film vividly and comprehensively portrays the difficulties and suffering faced by individuals with mental disorders, calling on society to break the cycle of being left unheeded, to prioritize mental health, and to provide care.
	Third person	Esquizofrenia en mí	The film primarily focuses on mental health issues represented by schizophrenia, advocating for society to break down discrimination and prejudice, and to properly recognize and care for individuals with mental illnesses.
Nature	First person	Rose (violences intrafamiliales-violences conjugales)-	The film tells the story of a girl who grew up in a domestic violence environment and continued to suffer from domestic violence as an adult,

		finaliste au festival vidéo de l'OMS 2023	seeking self-redemption.
	Third person	Meeting the needs of pregnant and lactating women: MMV's MiMBa strategy	The film tells the story of the relentless efforts of the MMV to address the adverse effects of malaria on pregnant and lactating women.
	First person	Cooling Down Penang | Transforming Cities	The film depicts the impact of climate change on Penang, Malaysia, where the increasingly hot city severely affects people's lives and health.
Environment	Third person	Helsinki | Housing First for the Homeless	The film illustrates the significance of the "housing priority" principle in addressing Finland's homelessness issue, as housing security serves as a crucial prerequisite for other social protections.

Theme	Include/Exclude data	Film title	The film's main content
Psychology	Data	Akili	The film compiles the experiences of African patients in the form of poetry, calling for social attention to mental health issues and providing adequate care for those affected.
	No data	Mirrors	The film portrays the journey of three individuals with depressive moods toward self-reconciliation, declaring that depression is not shameful and

			must be confronted.
	Data	N3 (NIRODH NIROG NIRMAL)	In a time when sexual stigma still exists, the film breaks the taboo and highlights the importance of sexual health.
Nature	No data	RAMI CIKI {HOLE INSIDE} Short Film	The film depicts a girl who suffers from vaginal-cystic fistula after early marriage and stillbirth, with early marriage being a high-risk pathogenic factor, and elucidates its curability.
Environment	Data	Gen Z Mental Health: Climate Stories	The film explores how climate change impacts Gen Z's mental health and life choices globally, while also examining their future outlook on climate change.
	No data	Sound of Nature	The film shows the destruction of nature by human beings, and calls for better respect and protection of Mother Earth, so as to protect the future of the next generation of human beings.