Communication Mechanism and Optimization Strategies of Short Fitness-Based Videos on TikTok During COVID-19 Epidemic Period in China

Jinlong Shi[1], Gang Li[2]*, Yaru Zhao[3], Qifan Nie[4†], Shuyan Xue[2], Yangfan Lv[2], Yijing Zhang[2], Jiachen Yang[2] and Guoxu Du[2]

[1] Department of Physical Education and College of Urban and Environmental Sciences, Northwest University, Xian, China, [2] College of Urban and Environmental Science, Northwest University, Xian, China, [3] College of Physical Education, Sichuan Agricultural University, Yaan, China, [4] Alabama Transportation Institute, The University of Alabama, Tuscaloosa, AL, United States

Scientific and moderate exercise is an effective remedy to boost the immune system and minimize the risk of infection in coronavirus disease 2019 (COVID-19) epidemic period. In this context, social media platforms play an essential role in communicating scientific fitness at home. Based on the integrated analysis of communication, physical geography, and health geography, this article takes short fitness-based videos on TikTok as the research object and comprehensively uses text analysis, mathematical statistics, and spatial analysis to reveal the characteristics of communication elements, fitness preferences, and the spatiotemporal evolution of these short videos, and to explore the communication mechanism and optimization path of short videos. The results show that: (1) the communication information focusing on "fighting against the epidemic and keeping fit at home" is made into short videos by female youth. Through the communication channels mainly composed of texts, pictures, and audio, the communication subjects carry out multilevel interactive communication with the communication objects; (2) fitness preferences are mainly composed of dances, unarmed fitness, and fitness with equipment; (3) from the perspective of time, taking February 20 as the node, the daily number of released short videos shows a trend of "increase before decrease"; from the perspective of space, the distribution is significantly unbalanced across provinces, and the direction is not apparent; and (4) this article explores the communication mechanism and targeted optimization countermeasures of short fitness-based videos on TikTok in China's COVID-19 epidemic period.

Keywords: COVID-19, TikTok, fitness preferences, spatio temporal evolution, communication mechanism, optimization strategy

INTRODUCTION

Since its outbreak at the end of 2019, the novel coronavirus disease 2019 (COVID-19) has rapidly spread worldwide, which is a great threat to human safety, national harmony, and stability. At present, there is no "effective drug" for COVID-19 (The Beijing News, 2020). However, exercise with moderate intensity can improve human immunity (Neil, 2018) and reduce the risk of upper respiratory tract infection (Malm, 2006). Some scientific fitness behaviors can reduce the risk of COVID-19 infection (Ranasinghe, 2020). "Scientific fitness" refers to the use of healthy, scientific exercise methods to promote physical health, such as which exercise method is correct, which is suitable for oneself, and how long an exercise is appropriate. Dating back to January 30, 2020, the general office of the State General Administration of Sports issued A Notice on Vigorously Promoting the Scientific Fitness Methods at Home, which advocates bodybuilding at home and sets off an upsurge of home exercise nationwide. However, the limited space makes it difficult to exercise at home (Zheng and Wong, 2020). How to exercise at home and advocate exercising at home are problems that need to be solved.

Short video applications are gradually becoming a new highlight of social media platforms in recent years. The users of TikTok reached 400 million (EB/OL, 2019) in January 2020, and TikTok has become the most popular social software of its kind. Given its wide application in people's daily lives, scholars have researched short videos from the perspective of communication studies, sociology, geography, culture, and other disciplines. The research of sociology focused on the value and communication strategy of TikTok. Taking the short videos of People's Daily as an example, Chen (2019) analyzes and puts forward the strategies of short video communication in mainstream media; Chen et al. (2019), Guo (2019), and Liu and Liang (2019), discuss the influence factors, characteristics, and strategies of communication of short videos about government affairs. Geography focuses on promoting and establishing the man-land relationship and sense of place. For example, based on the theory of media city, Wu and Zhou (2019) expound on the dynamic connection between people and places in modern media cities and the multiple social relations of urban residents; Wu (2019) analyzes the construction of a sense of place by the symbols (voice and pictures) of short videos from dimensions of locality and local attachment. Cultural studies focus on the propagation mode and the value of TikTok. For example, Huang and Dong (2019) and others point out that short video APP plays a vital role in promoting the dissemination and innovation of traditional folk culture. Xie (2019) analyzes the development of TikTok and points out that it has six major functions in cultural communication. All in all, short fitness-based videos on TikTok refer to short videos users post on the TikTok APP platform related to bodybuilding, such as how to do aerobic exercises and perform strength exercises. Because of the large number of participants and fast production, TikTok has been popular among the public and, under the current widespread epidemic, TikTok with the theme of home-based fitness is coming out in the unending flow.

This study takes short videos of fitness during COVID-19 epidemic in China as the research object. Specifically, this study analyzes the characteristics of communication elements ["5W" communication mode (Guo, 2011)], preference for fitness, mechanism of transmission, and space-time evolution process of short videos from the multidisciplinary perspective. The mechanism of transmission and optimization path provides a reference for in-depth research and assists in implementing the national fitness strategy based on social media communication platforms. The theoretical framework is shown in **Figure 1**.

MATERIALS AND METHODS

Dataset

Research data include: (1) short video data, as of March 12, 2020, taking the "epidemic fitness," "epidemic exercise," and "epidemic sport" as the searching keywords, 3,691 video information and summary forms have been collected from the TikTok platform (specific entries include user nickname, network account, release time, title, forwarding volume, the volume of likes, comment volume, POI point, etc.). After account deduplication, a total of 2,150 disseminators were obtained. Then, through artificial network query and interpretation, the detailed data of disseminators were obtained (including gender, age, address, occupation, number of works, number of followers, number of likes garnered, etc.) and (2) the relevant population and economic data come from the statistical yearbook of National Bureau of Statistics in 2019.

Methods

Text Analysis

Text analysis refers to quantifying information by extracting the expression and features of the language, text, image, etc. In this article, the fitness method, communication channels, and other information are obtained by interpreting the content of short fitness-based videos. Analyses were done on user occupation, the preference for fitness, and the dissemination channel characteristics. By summarizing the text of short video titles and using the word cloud tool of BlueMC platform (http://www.bluemc.cn/), the high-frequency words of short video titles were obtained to analyze the intention and purpose of users who posted short videos.

Standard Deviational Ellipse Analysis

Standard deviational ellipse (SDE) is a statistical method to represent the spatial distribution characteristics of geographical features (Lefever, 1926). The semimajor axis represents the distribution direction of geographical elements, while the minor semiaxis represents the distribution range. The greater the difference between the two is, the more obvious spatial directionality of geographical elements is. In this article, the standard deviational ellipse is used to reveal the trend of the disseminators.
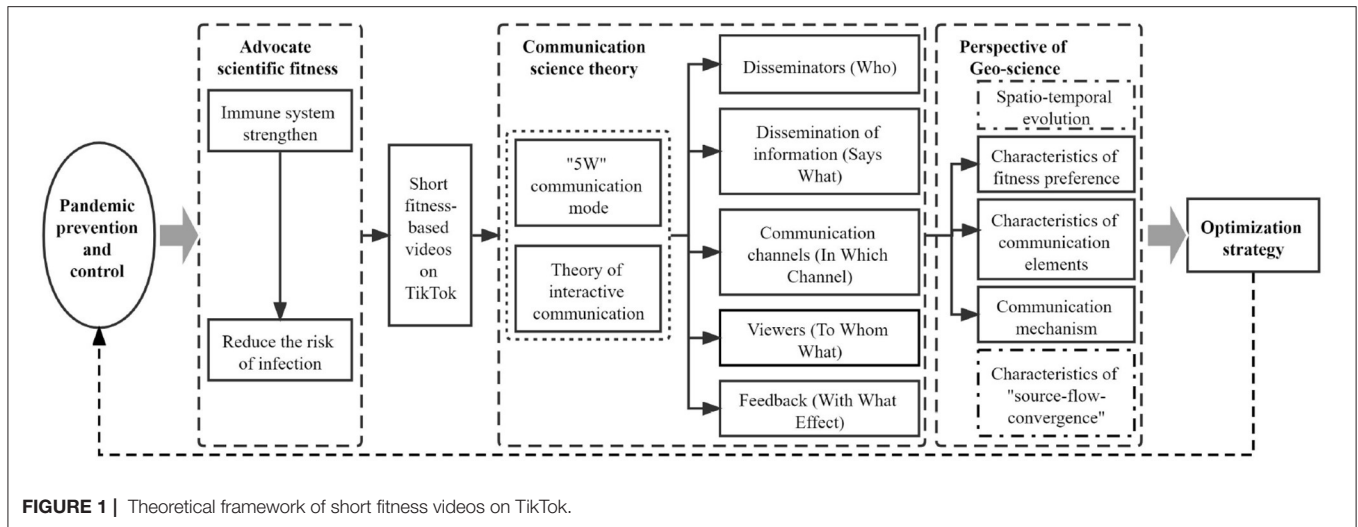
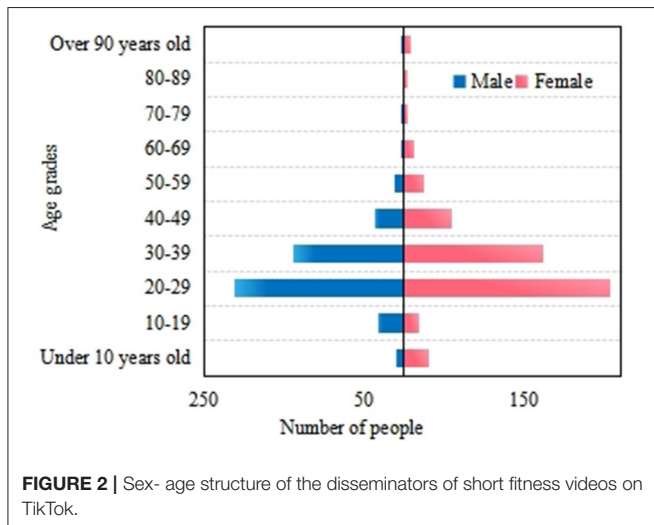**FIGURE 1 |** Theoretical framework of short fitness videos on TikTok.

FIGURE 2 | Sex- age structure of the disseminators of short fitness videos on TikTok.

Mathematically, the formula can be expressed as:

$$SDE_x = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}} \tag{1}$$

$$SDE_y = \sqrt{\frac{\sum_{i=1}^{n}(y_i - \bar{y})^2}{n}} \tag{2}$$

where x_i and y_i represent the geographic coordinates of the short video communicator i. $\bar{x}$ and $\bar{y}$ represent the average gravity center of short video communicators.

Getis-Ord Gi*

Getis-Ord Gi* is used to reveal the spatial distribution of hot spots and cold spots (Hu et al., 2019). The calculation formula is:

$$G_i^*(d) = \frac{\sum_{j}^{n} W_{ij}(d)X_iX_j}{\sum_{j=1}^{n} X_j} \tag{3}$$

After standardization:

$$Z\left(G_i^*\right) = \frac{\left[G_i^* - E\left(G_i^*\right)\right]}{\sqrt{Var\left(G_i^*\right)}} \tag{4}$$

where x_j is the attribute value of element j. $W_{ij}(d)$ is the spatial weight between i and j. n is the total number of elements. $E\left(G_i^*\right)$ and $Var\left(G_i^*\right)$ are the mathematical expectation and coefficient of variation of G_i^*. When $Z\left(G_i^*\right)$ is a positive value, and the value is larger, which means that the clusters of hot spots are more concentrated. When $Z\left(G_i^*\right)$ is a negative value, the value is smaller, which means that the clusters of cold spots are more concentrated.

CHARACTERISTICS OF COMMUNICATION ELEMENTS IN TIKTOK OF FITNESS CONTENTS

Characteristics of Disseminators
Demographic Characteristics

Among the 2,150 disseminators, 83.90% are gender specific, including 1,127 females and 677 males in a ratio of 1.66:1. A total of 48.70% of the disseminators provided their age. According to the statistics of 1,035 disseminators (**Figure 2**) with both the age and gender information provided, the male disseminators account for 42.83%, while the female disseminators account for 56.02%. The male to female ratio is 1.3:1. The age structure of the disseminators generally showed normal distribution and the people aged 20–39 years account for the largest proportion (80.5%), followed by 9% of those who are 20 years. Moreover, those over 60 years account for the least proportion (3%). In general, the disseminators of short fitness-based videos are mainly young women.

Occupation Analysis

The occupation of the short video disseminators is identified by artificial interpretation. The occupations of 622 are recognized,

TABLE 1 | Occupational characteristics of the disseminators of short fitness videos on TikTok.

Category I	Category II	Specific categories
Institution disseminator (46)	Official institution (32)	National track and field team, Sports Association, Jiangsu fire-control squat, Qinghai sports lottery, news broadcast, school, etc
	Non official institutions (14)	sports culture, sports services, etc
Individual communicators (576)	Specialized in fitness job (272)	fitness and yoga coaches, dance training, ball training, etc
	Athletes (43)	football, sports dance, martial arts, basketball, etc
	Other professions (261)	teachers, students, stars, anchors, hosts, doctors, makeup artists, etc

TABLE 2 | Statistics of works, fans and likes of the disseminators of short fitness videos on TikTok.

Volume of work		Vermicelli consumption		Praised quantity	
Quantitative interval	Number/piece	Quantitative interval	Number/piece	Quantitative interval	Number/piece
0	12	0	5	0	3
1–50	1,004	1–500	1,377	1–10,00	990
51–100	441	501–1,000	169	1,001–10,000	665
101–500	608	1,001–10,000	404	10,001–100,000	321
501–1,000	62	10,001–100,000	135	100,001–1.000,000	120
1.001–2.000	19	100,001–1,000,000	51	1,000,001–10,000,000	45
2,001–2,524	4	1,000,001–3,927,000	9	10,000,001–44,845,000	6
Total	258,619	Total	299,104,710	Total	38,392,493

accounting for 29.07%. According to the classification of occupations (**Table 1**), it can be seen that most disseminators are self-employed (576), and institutional disseminators are few (46). Among the self-employed, 272 are engaged in specialized fitness jobs, ranking first. They are mainly fitness and yoga instructors. The second largest group has 261 people, most of whom are teachers and students. There are 43 athletes in football, sports dance, martial arts, basketball, and other fields. In addition, there are 32 official agencies among the institutions, such as the national track field team, and sports associations. Lastly, there are 14 unofficial agencies, mainly sports culture and service companies. It shows that the occupations of disseminators are in multidomains and have diversified and contemporary characteristics.

Features of Works, Followers, and Likes

The number of works represents the TikTok account activity. The number of followers reflects the popularity and mass base of the disseminators (Zhao and Cao, 2014). The number of likes reflects the public's recognition of the information (Zhang and Wang, 2020). **Table 2** shows that 78.59% of the disseminators have 1–100 works. A total of 67.17% of disseminators have followers in the range of 1–500. Only 51 disseminators have more than 100,000 followers, and nine have more than one million followers. 80.73% of the disseminators get 1–10,000 likes. Only 45 disseminators got more than one million likes. Moreover, six of them got more than ten million likes. All the three data groups showed that the quantitative interval was inversely related to the number. During the epidemic period, if each disseminator releases a short fitness-based video, 299,104,710 followers would be directly affected.

During the epidemic, 1,729 disseminators only released one short video, accounting for 80.42% of the total. The number of performers is negatively related to the number of short videos released (**Figure 3**), indicating that these performers are not long-term fitness professionals.

Characteristics of Information Dissemination

Features of "Forwarding", "Likes", and "Comments"

Table 3 shows that the "likes" have the highest number of times (1,301,559), as this function is the simplest way of expressing the love of the viewer for a short video who would like to review it again. The second-largest number is the volume of forwarding, which is 130,483. Comments have the least number, which is 69,856 times. It is an interactive channel established by the performer and the viewer. The viewers give feedback such as opinions and consultations in the comment area, and the performers answer their questions. Vertically, there is a negative correlation between the quantitative interval and the number.

Analysis of Titled Text

Table 4 shows five words with a frequency of over 1,000, which are epidemic, fitness, exercise, resistance, and stay-at-home, accounting for 50.61% of the total. It indicates people's high attention to the epidemic of COVID-19. The words "fight," "defeat," and "resist" present the performers' attitudes toward the spread of the epidemic.

This article classifies and analyzes the sememes of high-frequency words, among which the largest proportion is related to "sports," such as exercise, yoga, stretching, and strength. Second, the two words "fitness" and "sports" are highly inclusive,
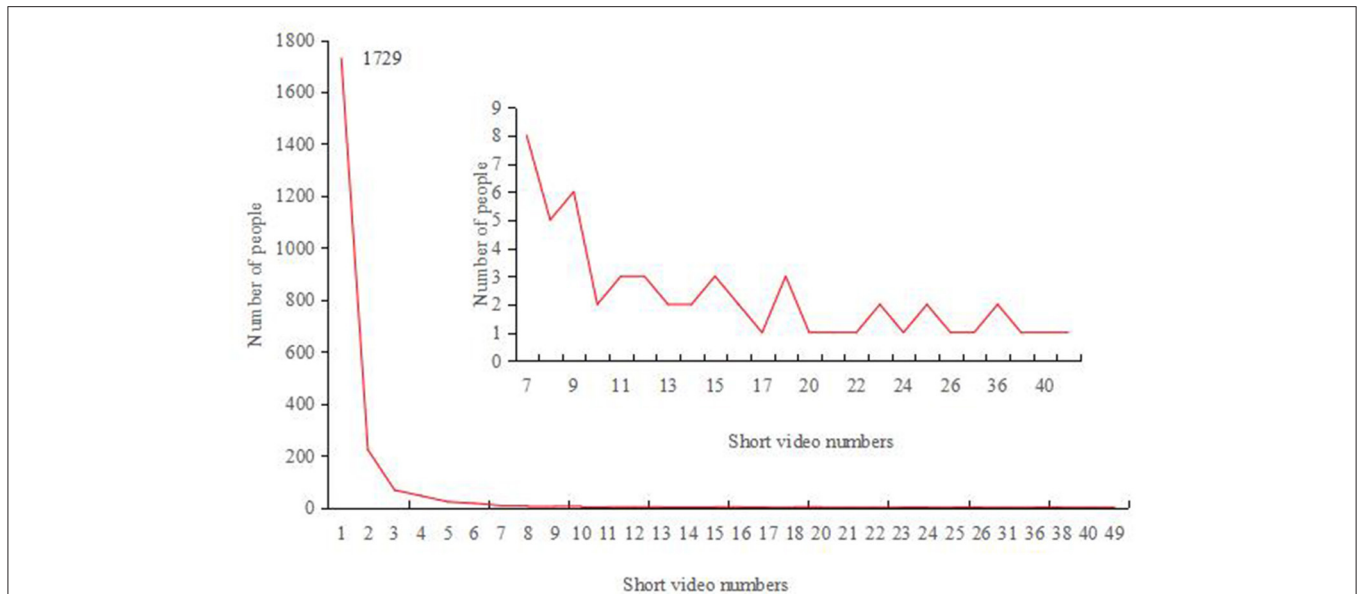
FIGURE 3 | Quantity characteristics of short videos released by individual disseminators during COVID-19 epidemic period.

TABLE 3 | Statistics of forwarding, likes and comments of short fitness videos on TikTok.

Forwarding volume		Praise points		Comment quantity	
Quantitative interval	Number/piece	Quantitative interval	Number/piece	Quantitative interval	Number/piece
0	2811	0	48	0	1,000
1–100	829	1–100	3,165	1–100	2,630
101–1,000	46	101–1,000	400	101–1,000	58
1,001–10,000	5	1,001–10,000	72	1,001–10,000	3
10,001–98,655	1	10,001–633,652	7	10,001–19,511	1
Total	130,483	Total	1,301,559	Total	69,856

reflecting the performers' preference for fitness during the epidemic. Next, the expressions indicating "space" (including province, city, and family) account for a large proportion, such as natives of Qinghai, Wuhan, home, at home, stay-at-home.

At the same time, a few videos are interspersed with many "funny" and "amusing" contents, which damage the scientific nature and strictness of fitness.

Fitness Preferences

According to the number of likes, the top 200 videos were selected. Thirty-three unrelated videos were excluded. Two hundred thirty-three were randomly selected from the remaining videos except for the top 200 videos. The fitness preference of the 400 videos was analyzed. It can be divided into six types (**Table 5**). They are dance (121), barehanded exercise (98), equipment-based exercise (84), gymnastics (46), traditional exercise (27), and yoga (24). The first three categories account for 75.75% of the total, among which the dance category mainly includes sports dance, square dance, and simple movement dance. It can be seen that the square dance and sports dance have huge followers. With its simple and easy-to-learn movement style and light and flexible music and rhythm, simple movement

dance attracts many young people to learn and take photos. Unarmed exercise is characterized by single actions, which are easy to learn and can cause a butterfly effect, such as push-ups, plate supports (star plate support challenge round), sit-ups, and squat-ups. Fitness with equipment mainly includes special equipment and household appliances. The former is home-based fitness equipment (treadmill, dumbbell, kettlebell, etc.) purchased by a small number of fitness enthusiasts. The latter refers to substitutes for fitness equipment like doors, walls, beds, rice bags, towels, sofas, chairs, cans, etc.

At the same time, we found some security risks in a few fitness movements, such as "pull up with the help of the door frame." Therefore, the selection of actions by the recipients should be determined following their conditions. In addition, the short video platforms still need to be designed to strengthen supervision and offer risk tips.

Characteristics of Communication Channels

According to the statistical explanations of the bodybuilding action on TikTok (**Figure 4**), only 68 out of the 400 short videos have explained their actions (17%). Eleven of them offer

TABLE 4 | High frequency glossary of titles in short fitness videos on TikTok.

High frequency word	Frequency	High frequency word	Frequency	High frequency word	Frequency	High frequency word	Frequency	High frequency word	Frequency
Epidemic	4,166	Resist	203	Don't go out	75	Teacher	27	Intensive exercise	15
Fitness	2,815	Persist	188	Immunity	72	Dancing	27	Fight	14
Exercise	2,121	Action	167	Move	68	Aerobic	27	Dumbbell	14
Stay-at-home	1,800	China	164	Tongchuan	64	Whole body	26	Badminton	14
Resistance	1,096	Dance	148	Plaza	62	Stretching	26	Taekwondo	13
Health	770	Training	126	Federation	56	Strength	26	Latin dance	13
Qinghai native	661	Wuhan	119	Improve	50	Taiji	24	Indoor	12
Sports	582	Self	116	Coaches	49	Official	23	Hunan	12
Qinghai	536	Everyday	105	Strengthen	46	Fighting	23	Body	12
Period	437	Indoor sports	103	Gym	46	Abdominal muscle	22	Whole family	11
Whole people	418	Family	100	Practice	44	Boxing	19	Muscle	11
Come on!	345	Yoga	95	Parenting	42	Rope-jumping	18	Baby	11
Aerobics	273	Lose weight	95	Push ups	37	Kids	17	Baduanjin (martial art)	10
Win	265	Challenge	91	Support	35	Country	17	Speed	9
Qinghai province	252	At home	85	Running	33	Broadcast gymnastics	17	Belly dance	9
Association	244	Everyone	81	Basketball	33	All in all	16	Total	20,114

TABLE 5 | Fitness preference statistics of the disseminators of short fitness videos on TikTok.

Action type	Action form (number/piece) (action name)	Total number/piece
Dance	Sports Dance (32) (Latin dance, ballroom dance), square dance (30), simple dance (26), street dance (19), folk dance (13), belly dance (1)	121
Unarmed exercises	single action type (64) (push-ups, prop-ups, sit-ups, squat-ups, etc.), comprehensive type (34) (multiple action combinations)	98
Fitness equipment	special equipment (38) (dumbbells, barbells, fitness balls, pull belts, balls, treadmills, etc.), household products (30) (doors, walls, beds, rice bags, towels, sofas, chairs, cans, etc.), games (16) (parent-child games, electronic games, pairs cooperation type)	84
Gymnastics	rhythmic body (10), skill (7) (somersault, handstand, etc.), artistic gymnastics (2) 46	46
Traditional type	Folk Sports (11) (shuttlecock, rope skipping, etc.), freestyle grappling (8) (freestyle grappling, taekwondo, etc.), martial arts routine (7) (long punch, Taiji, Yongchun boxing, broadsword), guided health preservation (1) (Baduanjin(martial art))	27
Yoga		24

Simple movement dance is a popular form on the Internet.

voice explanation, 37 videos provide text annotation, and 20 videos contain both the voice and text explanations. The content of voice explanation mainly includes teaching fitness methods and technical requirements of movements. The text annotation mainly comprises the description of the names of movements, the number of exercises, and the number of the set of actions. TikTok, as a whole, is mainly composed of music and videos and transmitted through pictures and sound, with only a few having the text as well.

Viewers and Their Feedback

According to the theory of interactive communication, the feedback route of bodybuilding TikTok is analyzed (**Figure 5**). It is found that after receiving the short video, a receiver (category one) takes four actions: first sending feedback to the disseminator through attention, likes, and commentary. The disseminator collects the feedback from the recipient, adjusts and modifies the short video, and then releases it to the recipient again, forming first-order feedback. Second, the recipients can also be called new disseminators by participating in and sharing their short videos, and distribute them to new recipients [for category one (TikTok), for category two (WeChat, QQ, microblog, etc.)], thus repeating the first-order feedback, and forming second-order feedback. Third, no feedback, just for entertainment, and killing time or due to behavioral addiction. On the whole, the recipients can also be called new disseminators who can repeat

first- and second-order feedback, forming a complete feedback loop of TikTok.

CHARACTERISTICS OF TIKTOK IN SPACE AND TIME

Time Variation Characteristics
Changes in Release Time

According to **Figure 6**, February 20 is a turning point in the number of daily releases. The number of daily releases increases initially and decreases afterward. Before January 30, the number of short fitness-based videos decreased because most people were busy purchasing for the Spring Festival. On January 30, to fight the epidemic, the general office of the State Sports General Administration issued *A Notice Titled On Promoting Scientific Home-based Fitness Methods* to guide people to strengthen their exercise, improve their immunity, and reduce the risk of infection. The launch of the TikTok topic, "fight the pandemic by all," prompted users to share their fitness experience. The first surge of growth (117) occurred on February 13, with a slight

decrease on February 14 (89). With a rise of awareness of home-based exercise, from February 15 to 23, the number of related videos grew steadily, reaching a peak starting from February 21 to 23. From February 24 to March 6, the number of video clips showed a fluctuating downward trend due to the effective control of the epidemic; the number increased again on March 7. From March 7 to 11, due to the significant control of the epidemic, the public's demand for home-based sports declined alongside the number of short videos. Overall, traditional culture, epidemic development, government, and platform guidance are the main factors that affected the number of TikTok videos.

Changes of Individual Time

According to the time-varying graphs of TikTok (**Figure 7**), the duration of short fitness videos mainly ranges from 10 to 15 s, reaching two peaks at 15th and 59th seconds, with the largest number of videos lasting for 15 s. Because of the fast pace of life, fragmentation of reading has become the trend (Hu et al., 2019), so TikTok mainly provides 15-s-long short videos for viewers. Videos lasting less than 40 s are greater in number than those exceeding 40 s and the videos over 1 min are very rare, accounting for a tiny proportion. Although the platform supports uploading videos of 1–15 min the uploading process is complex and entails more recording requirements.

Spatial Distribution Characteristics
Overall Spatial Distribution

Figure 8 demonstrates the strong disequilibrium and the insignificant directivity of fitness-based videos' provincial distribution. The core and eastern coastal areas cluster together in Shaanxi, Guangdong, and Qingdao work. At the same time, most of the disseminators are in the southeast of Hu Huanyong Line (demographic boundary of China), which is consistent with the geographical distribution pattern of the Chinese population. Using the Pearson correlation coefficient, we can find that the number of disseminators in a region is significantly related to the locality's economic development level, tertiary industry development level, and population scale (**Table 6**). Further analysis of the provincial differences shows
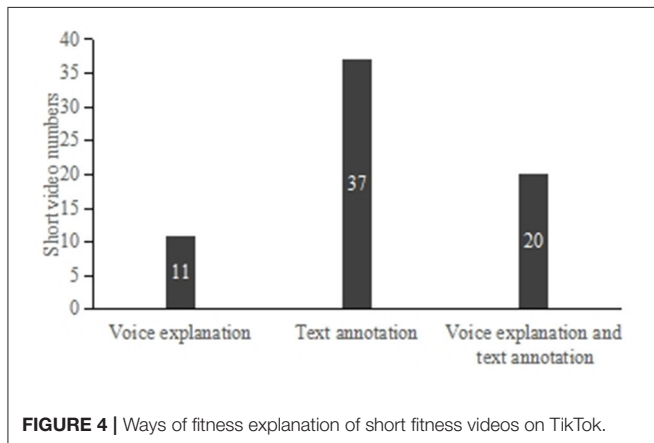

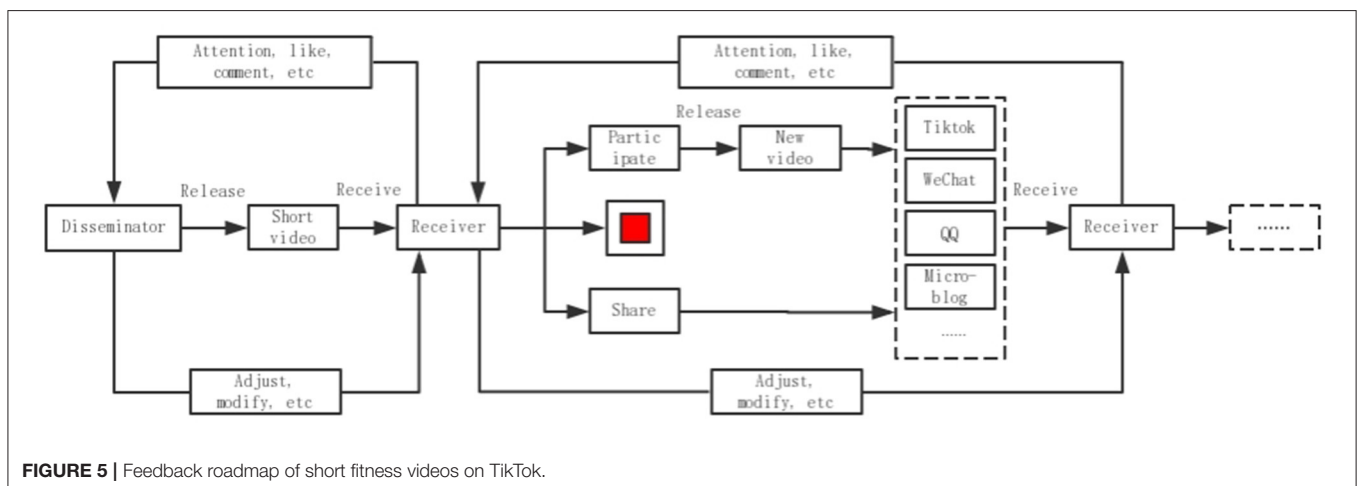**FIGURE 4 |** Ways of fitness explanation of short fitness videos on TikTok.

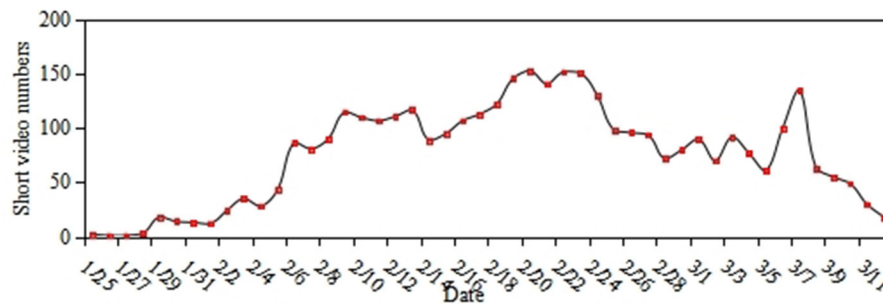**FIGURE 5 |** Feedback roadmap of short fitness videos on TikTok.

FIGURE 6 | Changes in release time of short fitness videos on TikTok.
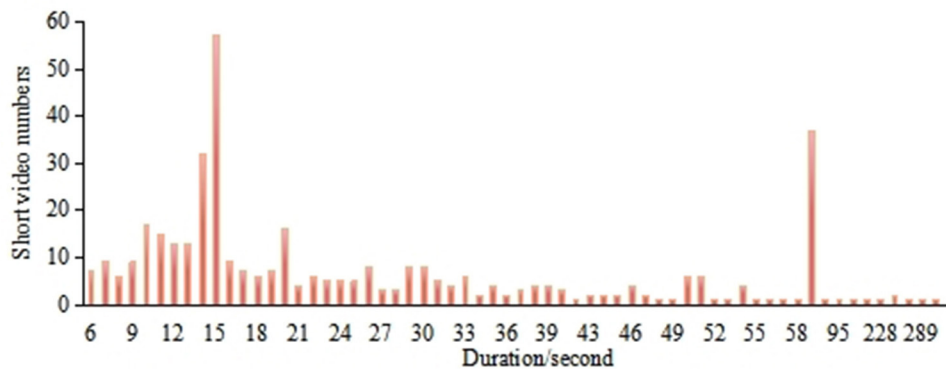

FIGURE 7 | Changes in duration of short fitness videos on TikTok.

that there are more disseminators in Qinghai and Shaanxi owing to the official guidance in these provinces such as Qinghai's sports development, Qinghai's sports lottery, various associations in Qinghai (football association, dance association, yoga association, etc.), Shaanxi scientific fitness publicity ambassador, Shaanxi National Games, and efforts to strengthen urban publicity through the network platform in recent two years to build an "internet city" in Shaanxi.

Characteristics of Spatial Evolution

According to the analysis of the number of provincial hot spot short videos (**Figure 9**), the hot spots are mainly concentrated in the junction of North, Central, and East China. From January 25 to February 15, 99% of the hot spots were distributed in Shandong, Henan, Jiangsu, and Anhui provinces and 95% were distributed in Shaanxi, Hunan, Shanxi, Hebei, and Zhejiang provinces. From February 16 to 25, 95% were distributed in Ningxia province and 90% were distributed in Gansu and Sichuan provinces. From February 26 to March 5, 99% were distributed in Anhui province. From March 6 to 12, 95% were distributed in Ningxia province and 90% were distributed in Anhui province. It can be seen that the hot spots gradually decreased and dispersed with time.

TRANSMISSION MECHANISM AND OPTIMIZATION PATH OF TIKTOK

The communication mechanism is the unity of communication forms, methods, and processes, namely, disseminators (communication subjects), communication channels, communication information, and receivers (communication objects). It is an overview of the channels of information from issuers to receivers (Liu and Ren, 2015). China's TikTok fitness-based short video transmission mechanism in COVID-19 pandemic is explored based on the characteristics of "source-flow-convergence" diffusion in geographical studies (**Figure 10**): (1) "source" is a short video focusing on dance, barehanded fitness, and equipment fitness, with "fighting the pandemic, home-based scientific fitness methods" as the primary communication information. It is positioned by the platform, influenced by network culture and government guidance, dominated by female youth, and characterized by multiple occupations, multiple fields, and unbalanced industrial and regional distribution, and is released to the most popular TikTok APP platform. (2) The communication object receives short videos with sound and pictures as the main communication channels through the platform and provides information feedback to the communication subject through "forwarding," "likes," and "comments." The communication subject adjusts the
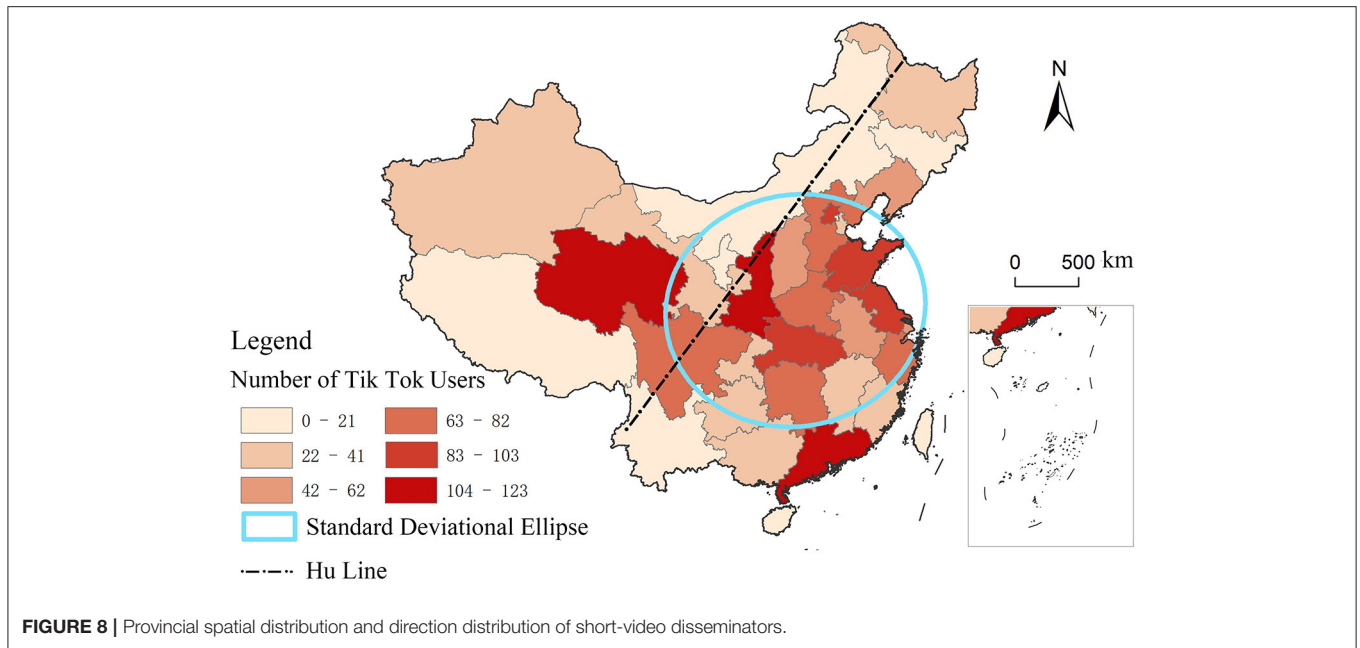
FIGURE 8 | Provincial spatial distribution and direction distribution of short-video disseminators.

TABLE 6 | Correlation index statistics of the number of provincial disseminators.

	GDP/100 m yuan	GDP of the tertiary industry/100 m yuan	Total population at end of yr/10,000
Pearson correlation coefficient	0.630**	0.633**	0.534**
Significance (double tail) index	0.000	0.000	0.002

**P < 0.01.

content through the viewer's feedback and then posts it to the communication object (primary feedback). The communication object can also be a new communication subject who will release their videos to TikTok, WeChat, QQ, microblog, and other platforms to receive feedback (secondary-level feedback). This repeated release-receive-feedback will be regarded as "flow." In this process, affected by "fragmented" reading, traditional culture, pandemic development, economy, and culture development of various provinces, the duration of short videos ranged from 10 to 15 s and their number initially increases and then decreases with February 20 as the starting point. The evolution of hot spots shows the characteristics of gradual reduction and dispersion. (3) Under the influence of interactive video communication, the users of TikTok and other platforms can keep their fitness in the home, enhance immunity and reduce the risk of infection, which further enhances the awareness of national fitness under the influence of short videos of fitness classes.

(1) For the "source": First, the development of TikTok should be phased. During the pandemic, doing exercise at home is the priority. Then, toward the end of the epidemic, the task should be based on the principle of promoting fitness for the whole nation, taking social responsibility, and spreading positive energy. Second, the relevant government departments, industries, and individuals should attach importance to short videos and strengthen cooperation with the TikTok platform. TikTok can be released through official accounts to offer scientific and professional fitness guidance. For example, during the epidemic period, fitness coaches, athletes, and sports associations have spread scientific fitness methods by using the TikTok platform, which has made a tremendous impact. Third, government departments at all levels should keep up with the development of the Internet, do an excellent job to meet the arrival of the 5G era, and move forward to build a sports power by implementing the national fitness strategy through social media communication platforms.

(2) For "flow": First, further enrich the short video contents. Second, we should enhance the quality of creation to come up with high-quality topics and make full use of the feedback mechanism of TikTok to attract more performers to participate in TikTok and improve the frequency and effect of interaction. Third, making full use of auxiliary functions such as text annotation and voice explanation to give short videos more vitality based on improving the scientificity and preciseness of information dissemination.

(3) For "convergence": First, pay attention to the learning function of TikTok. It is not a platform just for entertainment. Second, improving the ability to choose scientific and appropriate fitness methods. Third, arranging the time reasonably to avoid indulging oneself. TikTok
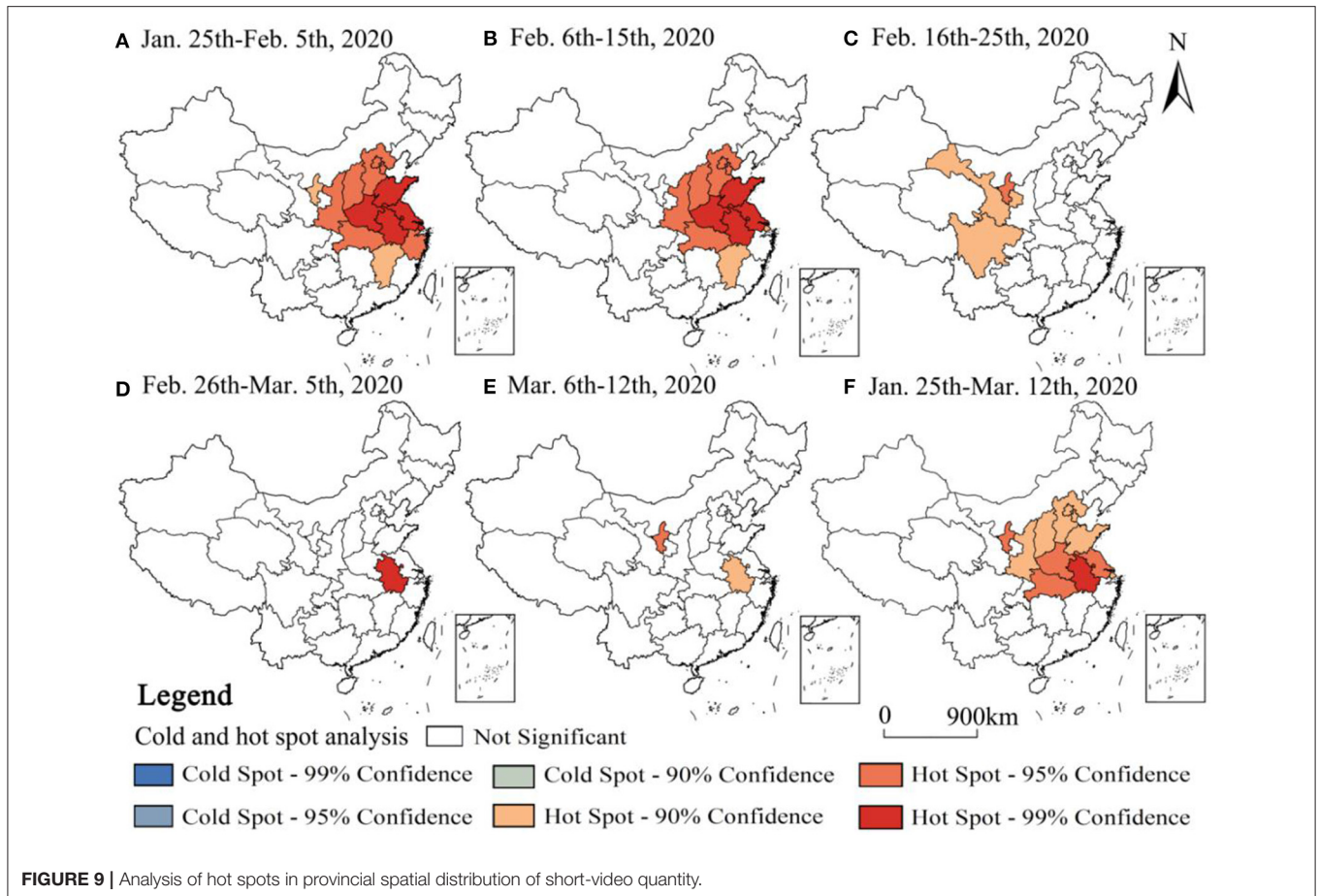
FIGURE 9 | Analysis of hot spots in provincial spatial distribution of short-video quantity.

uses an intelligent recommendation algorithm, and the recommended videos are mainly targeted to an interested audience who may easily wallow in them. So, it is necessary to exercise self-control and not rely on them too much.

CONCLUSION AND DISCUSSION

Conclusion

The main conclusions are as follows:

(1) Characteristics of communication elements: First, the main disseminators are young females whose occupations involve many fields. Second, the main content of information dissemination is fighting against the epidemic, keeping fit at home, and strengthening immunity. Third, the communication channel is mainly in short videos through pictures and sound. Fourth, the disseminator and recipient carry out the multilevel interactive dissemination through the TikTok platform.

(2) Fitness preference features: Dance, barehanded, and equipment-based exercises are the main types. It shows that types of dance mainly include sports dance, square dance, and simple movement dance. Barehanded exercise primarily consists of a single movement, supplemented by comprehensive bodybuilding. Equipment-based fitness

mainly involves special equipment, supplemented by household appliances. A few movements have potential safety hazards. Thus, supervision and warning should be strengthened.

(3) Spatiotemporal evolution characteristics: February 20 was a dividing line, where an "increase followed by decrease" trend occurred. The change of time length of the individual video ranged from 10 to 15 s, with 15-s videos being the largest in number. The distribution is significantly unbalanced across provinces regarding space and the direction is not apparent. The evolution of hot contents is gradually decreasing and dispersing across provinces.

(4) Optimization countermeasures: Home-based scientific fitness is the main task during the epidemic. In the later epidemic period and 5G era in the future, governments at all levels, industries, and individuals need to keep up with the development of the Internet, spread positive energy with the help of social media communication platforms, boost the implementation of the national fitness strategy, and move forward to build a sports power.

Discussion

The TikTok platform plays a vital role in dealing with fragmented reading and the demand for home fitness. It
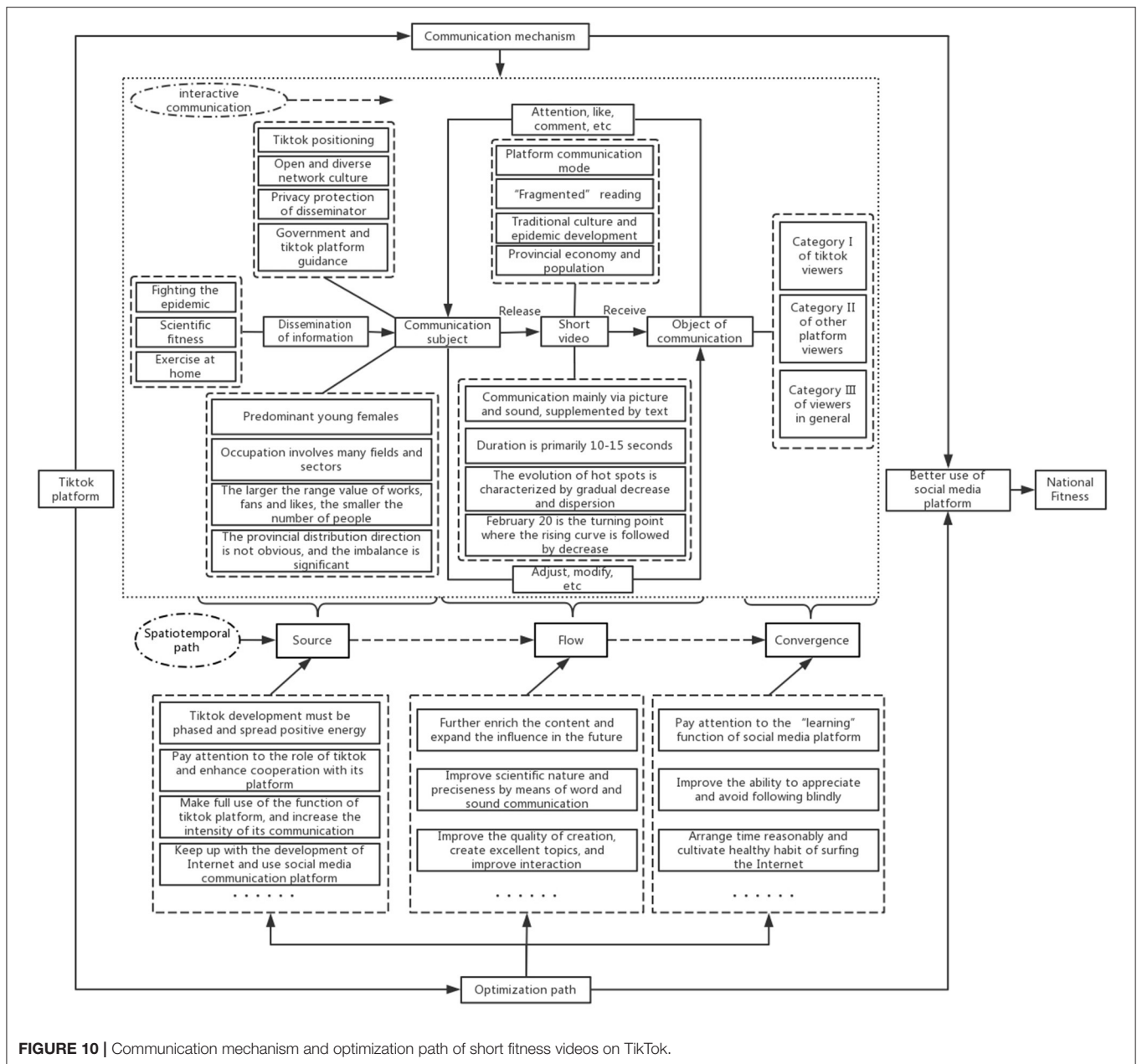
FIGURE 10 | Communication mechanism and optimization path of short fitness videos on TikTok.

can be seen that the openness and universality of social media communication platforms have provided space for the development of sports. However, due to its low threshold and inclusiveness, the quality of relevant information varies. Therefore, how to better use the social media communication platform to spread positive energy, help implement the national fitness strategy, and build a sports power is an important topic that needs further exploration in the future.

It is a positive attempt from a broad perspective through a narrow topic. The work that needs further strengthening in the future includes: (1) the research on the official account of sports TikTok from the microperspective, and the communication characteristics, influencing factors and communication strategies based on the location of TikTok. (2) Carrying out regional research based on a macroperspective, exploring the characteristics of regional sports culture, and evaluating the strength of communication and publicity strategies with the help of cultural geography. (3) Based on the big data of social media, communication studies, and cultural geography, we should continue to explore the mechanism and strategy of social media platforms and influence on the implementation of national fitness strategy and the construction of sports power.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

GL and JS designed the research. JS and YZhao performed the research. YL, JY, and GD analyzed data. JS wrote the paper. QN, GL, YZhang, and SX revised the manuscript. All authors reviewed the manuscript, contributed to the article, and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2022.778782/full#supplementary-material

REFERENCES

Chen, J. (2019). Analysis of the strategy of short video communication in the mainstream media: taking the short video of the people's daily as an example. *Journalism Lover*. 12, 36–38. doi: 10.16017/j.cnki.xwahz.2019.12.010

Chen, Q., Gao, X., and Chen, S. (2019). Study on the influence factors of public participation in government short videos: taking the "Chinese Communist Youth League" Government TikTok As an Example. *E-Government* 10, 13–21. doi: 10.16582/j.cnki.dzzw.2019.10.002

EB/OL (2019). *2019 TikTok Data Report*. Available online at: http://www.douyin.com/ (accessed January 5, 2020).

Guo, P. (2019). Analysis of the short video communication strategy of Government affairs: taking the "China Fire Protection" Government TikTok As an Example. *Media* 2019, 54–55.

Guo, Q. (2011). Communication course. Beijing: China Renmin University Press.

Hu, X., Zhang, Z., and Chen, X. (2019). Geographic detection of spatial-temporal difference and its influencing factors on county economic development:a case study of Gansu province. *Geography Res*. 38, 772–783. doi: 10.11821/dlyj020171169

Huang, L., and Dong, X. (2019). Study on the influence of short video on the spread of excellent folk culture. *Contemporary Commun*. 5, 50–53.

Lefever, M. (1926). Measuring Geographic Concentration by means of the Standard Deviational Ellipse. *Am. J. Sociol*. 1, 88–94. doi: 10.1086/214027

Liu, H., and Ren, D. (2015). Network public opinion communication and control mechanism. *Inform. Sci*. 33, 20–24. doi: 10.13833/j.cnki.is.2015.04.006

Liu, L., and Liang, M. A. (2019). The spread of government short video and its influencing factors: an empirical study based on government TikTok. *E-Government* 7, 11–19. doi: 10.16582/j.cnki.dzzw.2019.07.002

Malm, C. (2006). Susceptibility to infections in elite athletes: the S-curve. *Scand. J. Med. Sci. Sports*. 16, 4–6. doi: 10.1111/j.1600-0838.2005.00499.x

Neil, P. W. (2018). Recommendations to maintain immune health in athletes. *Euro. J. Sport Sci*. 17, 6035. doi: 10.1080/17461391.2018.1449895

Ranasinghe, C, Ozemek, C, and Arena, R. (2020). Exercise and well-being during COVID-19: time to boost your immunity. *Expert Rev. Anti. Infect. Ther*. 18, 12. doi: 10.1080/14787210.2020.1794818

The Beijing News (2020). *Huashan Hospital Zhang Wenhong on the treatment of new coronal pneumonia "what is the most effective drug"* [EB/OL]. Available online at: http://www.bjnews.com.cn/ (accessed February 6, 2020).

Wu, L. (2019). *Mobile Short Video on Construction of City Sense of Place[D]*. Chengdu: Chengdu University of Technology.

Wu, W., and Zhou, M. (2019). Hometown in douyin: research on the sense of place of the youth in the online celebrity city. *China Youth Study*. 12, 70–79. doi: 10.19633/j.cnki.11-2579/d.2019.0163

Xie, Q. (2019). The thought of the social interaction and cultural function of the TikTok app. *Movie Rev*. 23,101–104. doi: 10.16583/j.cnki.52-1014/j.2019.04.023

Zhang, X., and Wang, Y. (2020). Information dissemination efficiency evaluation of network public opinion of the government microblogs based on input - output analysis. *Inform. Sci*. 38, 43–48. doi: 10.13833/j.issn.1007-7634.2020.05.006

Zhao, A., and Cao, G. (2014). Positive study on evaluation and comparison of government affairs micro - blog influence: based on factor analysis and cluster analysis. *J. Intell*. 33,107–112.

Zheng, C, Huang, WY, Sheridan, S, Sit, CHP, Chen, XK., and Wong, SHS. (2020). COVID-19 pandemic brings a sedentary lifestyle in young adults: a cross-sectional and longitudinal study. *Int. J. Environ. Res. Public Health*. 17, 6035. doi: 10.3390/ijerph17176035