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A study on the mechanism of the influence of short science video features on people's environmental willingness in social media—Based on the SOR model

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Based on the SOR (Stimulus–Organism–Response) model, the influence of short science videos on people's environmental willingness is explored from the perspective of stimulus response, and their intrinsic mechanisms of action are explored. The study finds that the content features of short videos (usefulness, ease of use, and entertainment) can positively influence people's environmental willingness through two paths: emotional evocation and perceptual fit. In addition, we should focus on the emotional resonance of people's hearts and bring into play the advantages of sound and picture so as to enhance and optimize the persuasive effect of short science videos on people.

KEYWORDS

social media, short science video, environmental willingness, SOR model, environment

Introduction

In September 2020, China announced to the world at the United Nations General Assembly the goal of achieving carbon peaking by 2030 and carbon neutrality by 2060 (Wang et al., 2022a). In response to environmental protection issues, although China has enacted laws and regulations to conserve resources and protect the environment and has promoted scientific guidance, the reality of environmental problems has not yet been effectively addressed (Wei et al., 2021). The general public lacks awareness of environmental protection and simply understands it as sanitation, greening, etc., (Zhang and Hanaoka, 2021). They believe that environmental protection is the responsibility of the government and do not consider the impact of their own activities on the environment, their participation in environmental protection is low, and the culture of universal participation in environmental protection is far from being formed (Wu, 2021).

In the age of mobile internet, social media has become an important tool for people to learn, work, and live (Song et al., 2021). By June 2021, the number of short video users in China reached 832 million, accounting for 85.8% of all internet users (Li and Wang, 2021).

With the increase in number of short-form video users and the promotion of new technologies and applications, short-form video content will further shift from general entertainment to vertical content and become a powerful tool for public education (Yang and C Treadway, 2018). Compared to traditional methods of environmental protection publicity, the use of short videos to organize and carry out environmental protection publicity can further improve efficiency and quality (Risselada et al., 2018). However, the effect of environmental protection propaganda on social media is not ideal, so it is a matter of concern of how to improve people's environmental behavior through social media short videos (Pike and Lubell, 2018).

With the advent of short video platforms, the role of short videos on science topics in enhancing people's knowledge base has been widely received by the academic community (Lin et al., 2019; Liu et al., 2019). However, most of the current results focus on what kind of marketing effect science knowledge-based short videos has on users and how to produce good marketing effects from the perspective of communicators, but there is a lack of in-depth research on the psychological mechanisms between science knowledge-based short videos and people's environmental willingness (Zheng et al., 2022a). In order to better investigate the factors that influence people's environmental willingness in science knowledge-based short videos (Wang et al., 2022b), this study explored the intrinsic mechanism between the stimulus–response perspective of short videos and the public's environmental willingness using the SOR model of "stimulus–organization–response" theory and analyzed the factors influencing the public's environmental awareness of short video platforms in order to provide a reference for environmental protection work (Zheng et al., 2022b).

In this study, we verified through questionnaire data that the three features of short science videos (entertainment, usefulness, and ease of use) affect viewers' attitudes toward the videos (enhancing environmental intention). In addition, we found through further investigation that the three features of the videos mainly influence viewers' willingness to protect the environment through two psychological mechanisms (perceived fit and emotional arousal). This plays a key role in the design of future public service announcements and the promotion of environmental knowledge by environmental authorities. This study first introduces the background of the study, followed by a literature review and formulation of the research hypothesis, and finally validates the research hypothesis through data and draws conclusions that point to the management implications of this study.

Literature review and research hypothesis

The SOR theoretical model suggests that the stimulus of the external environment influences individuals' behavioral decisions by affecting their emotions (Zheng et al., 2022c). Stimulus refers to the factors that motivate and cause people to behave. Organism refers to an individual's internal psychological state, response refers to the various ways in which individuals exhibit stimulus, and organism based on response refers to the various behaviors or behavioral intentions that individuals display on the basis of stimulus and organism (Cai et al., 2021). In the SOR framework, the stimulus is generally used as the independent variable, organism as the mediating variable, and response as the dependent variable. In the process of users learning about environmental protection through the short video platform, the individual's organism, i.e., (Baltas et al., 2017) psychological state is generated by the content stimulus of the short video and in the process of interaction with other users (Gong and Li, 2017). The usefulness, ease of use, and entertainment of the short video will directly affect user experience and emotional evocation, which in turn affects people's environmental willingness and environmental behavior (Bergkvist et al., 2016).

The impact of short video features on the users' psychological state

According to research findings, entertainment, usefulness, and ease of use are the most important factors that attract users to view short videos (Treem and Leonardi, 2012; Chen et al., 2017). According to research reports, the desire for "fun" content ranks first in both Snack Video and Tik Tok, with skill demonstrations in second place and tutorials also very attractive to the public. According to the Short Video User Value Study 2020–2021 (INVALID CITATION), "humorous short video content is the most popular", and fun and entertainment are still the main factors that attract people to engage heavily (Davis et al., 2020). Bekalu M A (2018) found that people's judgment of the usefulness, ease of use, and entertainment of APPs will directly influence their behavioral intentions and usage behavior (Bekalu et al., 2018). Baltas. G (2017) confirmed that usefulness and ease of use, such as product-related descriptions and website navigation design, positively influence users' emotional evocation (Jiang et al., 2019). Lin J (2019) confirmed that the quality of the marketing platform entertainment has a positive effect on people's emotional evocation (Lin et al., 2019). Jiang C (2019) found that system quality and service level can significantly and positively influence perceptual fit (Mallapaty, 2020).

Therefore, the following hypotheses are proposed.

H1a: Entertainment positively influences individuals' emotional evocation.

H1b: Entertainment positively influences individuals' perceptual fit.

H2a: Usefulness positively influences emotional evocation.

H2b: Usefulness positively influences individuals' perceptual fit.

H3a: Ease of use positively influences individual emotional evocation; H3a: ease of use positively influences individual emotional evocation.

H3b: Ease of use positively influences individuals' perceptual fit.

The influence of the user's mental state on environmental willingness

Organism is an internal cognitive process in response to an external stimulus, in which the valid information generated by the organism due to the stimulus, such as feelings, perceptions and emotions, will become the basis for subsequent behavioral intentions and behaviors (Du et al., 2021). The emotions generated by an individual's exposure to the external environmental stimulus will cause the individual to engage in approaching or avoiding behaviors toward the environment and produce a mediating effect between the environment and behavior (Wei et al., 2020). Zhang R (2021) study shows that the quality of information on websites evokes people's inner emotions, which in turn triggers the production of environmental willingness (Zhang and Hanaoka, 2021); Wei W(2020) pointed out that information on green products provided by websites can positively cause people's emotional arousal, which in turn positively influences people's environmental willingness (Jimenez-Navarro et al., 2020).

Davis L S (2020) points out that algorithmic recommendation is an important indicator of good user experience (Davis et al., 2020). Jimenez-Navarro J P(2020) and others point out that perceptual fit has a significant positive impact on people's purchase of products or services (He et al., 2020). He J K (2020) found that perceptual fit significantly and positively influenced people's attitudes toward using social networking sites to obtain information about green products (Chen et al., 2020).

Therefore, the following hypotheses are proposed:

H4: Emotional evocation positively influences individuals' environmental willingness.

H5: Perceptual fit positively influences individuals' environmental willingness.

The mediating role of the user's psychological state

Zhang R (2021) found that external stimulus positively influenced people's environmental behavior by affecting factors such as emotional evocation, and Chen A (2020) found that emotional evocation positively influenced information choice and information dissemination in the process of information usefulness, content value, and information novelty (Zhou et al., 2019; Zhang and Hanaoka, 2021). Song G J (2021) found that emotional evocation plays a mediating effect in the process of information usefulness, content value, and information novelty, positively influencing information choice and information dissemination (Li and Wang, 2021; Song et al., 2021). Zhou Y (2019) concluded that perceptual fit affects the intention to continue using information by influencing satisfaction (Xiao et al., 2019; He et al., 2020).

Therefore, the following hypotheses are proposed:

H6a: Perceptual fit has a mediating role in entertainment's influence on individuals' environmental willingness.

H6b: Emotional evocation mediates the process by which entertainment influences individuals' environmental willingness.

H7a: Perceptual fit mediates the process by which usefulness affects individuals' environmental willingness.

H7b: Emotional evocation mediates the process by which usefulness affects an individual's environmental willingness.

H8a: Perceptual fit mediates the process by which ease of use influences individuals' environmental willingness.

H8b: Emotional evocation mediates the process by which ease of use affects an individual's environmental willingness.

Research model

In summary, using the SOR theory as the research framework and entertainment, usefulness, and ease of use as the antecedent variables of perceptual fit, emotional evocation, and people's environmental willingness, we constructed a model of the effect of science knowledge-based short videos on people's environmental willingness (Murphy et al., 2013). The research model of the influence of science knowledge-based short videos on people's environmental willingness was constructed (Figure 1).

Data collection

The content of the questionnaire was divided into two themes: first, the demographic characteristics of the sample, including gender, age, literacy, occupation, and income (Treem and Leonardi, 2012); second, the main variables of interest for this study, including usefulness, ease of use,

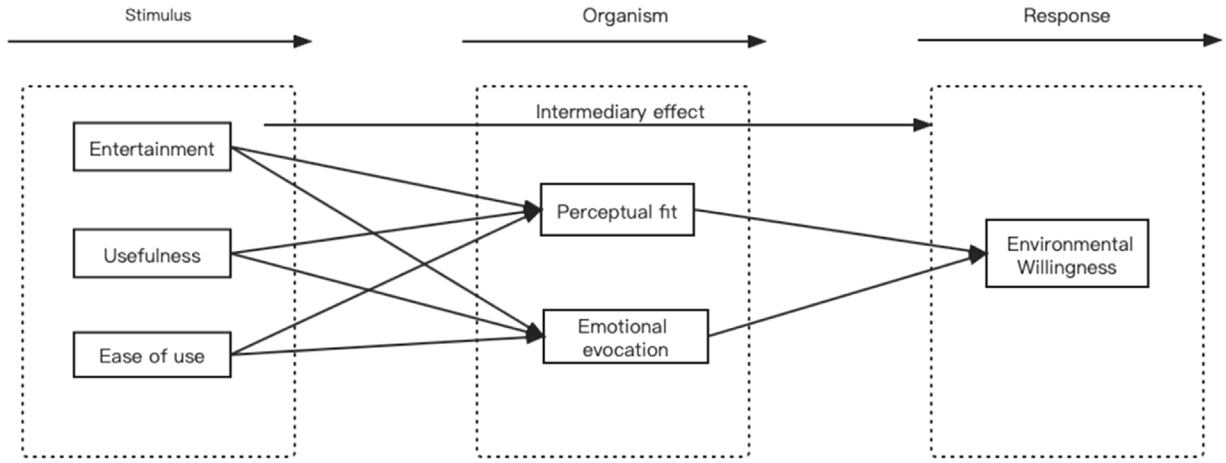

FIGURE 1
Framework of this study.

TABLE 1 Variable measurement terms and sources.

Variable	Measurement topic	Reference
Usefulness	1. Short science videos help me better understand information related to the environment	Jiang et al. (2019)
	2. Short science videos help me better choose green products that meet my needs	
	3. The videos help me make better decisions about environmental behavior	
	4. The information provided in the videos is useful to me	
Entertainment	1. I find the content of the short science videos interesting	Ben Yahia et al. (2018)
	2. I find the content of the videos relaxing	
	3. I found the user comments on the science videos interesting	
	4. In general, I think the content of the short science videos is interesting	
Ease of use	1. The total length of the short science video is reasonable and complete	Han et al. (2018)
	2. The screen of the short science video is clear and neat	
	3. The content of the short science video is clear and easy to understand	
	4. The short science video is played smoothly and at an appropriate pace	
Perceptual fit	1. The short science videos sent to me by the platform match my needs	Yang et al. (2015)
	2. The short science videos sent to me by the platform match my interests	
	3. The short science videos delivered to me by the platform match my expectations	
	4. I feel that the short science videos sent to me by the platform are highly relevant to my needs	
Emotional evocation	1. Short science videos can give me a clear understanding of the current state of the environment	Chen et al. (2013)
	2. Short science videos can make me feel anxious about environmental issues	
	3. The short science video can raise my concern about environmental issues	
	4. Short science videos can make me empathize with them	
Environmental willingness	1. I am willing to participate in environmental protection activities	Treem and Leonardi, (2012)
	2. I prefer to choose environmentally friendly products and services	
	3. I am willing to share environmental protection ideas with my friends	

entertainment, perceptual fit, emotional evocation, and environmental willingness (Dunlop et al., 2010). A 5-point Likert scale was used for this study, and the scales for most of the variables were derived from established scales in the authoritative literature to ensure reliability of the scales (Marku and Silver, 2008). The initial scale contained six constructs and 23 questions (Table 1) (Boyd and Ellison, 2007). A combination of convenience sampling and snowball

sampling was used to select the respondents for this study (Rimal and Real, 2005). A total of 372 questionnaires were collected, and 294 valid questionnaires were returned after eliminating the questionnaires with problems (short response time, contradictory options, etc.) and invalid questionnaires (not having followed the popular science video) (Ben Yahia et al., 2018). The characteristics of the sample were as follows: by gender, 30.9% were male and 69.1% were female; by age, 4.0% were aged 18 or below, 50.0% were aged 19–24, 18.1% were aged 25–30, 22.1% were aged 31–48, and 5.8% were aged 48 or above; by education level, 46.2% had a college degree or below, 38.1% had a bachelor's degree or equivalent, and 38.1% had a master's degree or above. In terms of educational attainment, 46.2% had a college degree or less, 38.1% had a bachelor's degree or equivalent, and 15.7% had a master's degree or above.

Data analysis

Reliability and validity tests

In this study, the intrinsic reliability of the scale was tested using Cronbach's Alpha and Composite Reliability, CR. The 294 sets of data collected were tested by SPSS 19.0, and the reliability of the latent variables' usefulness, ease of use, entertainment, perceptual fit, emotional evocation, and environmental willingness Cronbach's Alpha values, which are 0.875, 0.845, 0.812, 0.898, 0.875, and 0.901, respectively, indicate that the data obtained in this study have high reliability. In terms of content validity, most of the questions in this study were based on research scales designed by domestic and international scholars, and these research scales have been proven to be valid by some scholars through empirical studies, so the content validity of this study is valid and reasonable.

Model Fit Test

The model fit of the 294 questionnaires was found to be within the reference value through the AMOS 17.0 operational analysis, indicating that the model fit was good and acceptable (Table 2).

As seen in Figure 2, the model hypotheses of this study were all supported ($p = 0.000$ or $p < 0.01$). Entertainment, usefulness, and ease of use positively affect perceptual fit and emotional evocation. The study also showed that usefulness not only positively influenced environmental willingness through emotional evocation and perceptual fit but could also directly and significantly influence H1a, H1b, H2a, H2b, H3a, H3b, H4, and H5, which were verified.

Table 3 shows the direct and indirect effect values of the standardized regression coefficients for the structural equation model. As can be seen from Table 4, of the stimulus variables, usefulness had the greatest effect on users' environmental willingness, with a total effect of 0.512; followed by entertainment, with a total effect of 0.181; and ease of use, with a total effect of 0.142. Among the organism variables, emotional evocation had the largest effect on users' environmental willingness, with a total effect of 0.423, which was much higher than the perceptual fit's value 0.178.

Mediating effect test

As can be seen from Table 4, usefulness, ease of use, and entertainment have a significant positive effect on environmental willingness, and the coefficients become smaller after the introduction of the mediating variable perceptual fit or emotional evocation. Specifically, usefulness not only significantly and positively affects environmental willingness through emotional evocation but also can directly, significantly, and positively affect environmental willingness so that emotional evocation plays a partial mediating effect. In contrast, usefulness, ease of use, and entertainment can only significantly and positively influence environmental willingness through perceptual fit so that perceptual fit has a full mediating effect. Therefore, emotional evocation and perceptual fit can partially or fully mediate the effects of usefulness, ease of use, and entertainment on users' environmental willingness. Hypotheses H6a, H6b, H7a, H7b, H8a, and H8b hold true.

Discussion

Through model testing and mediating effect testing, we found that usefulness, ease of use, and entertainment can all significantly and positively affect perceptual fit and emotional evocation. This suggests that when short science videos are presented with usefulness, ease of use, and entertainment, these "Perceptual fit and Emotional evocation had a positive effect on environmental willingness. This suggests that positive 'organism' processes can trigger positive 'responses' from users.

Usefulness, ease of use, and entertainment differed in the extent to which they significantly positively influenced perceptual fit and emotional evocation. Among the factors that significantly and positively influenced perceptual fit, entertainment had the greatest influence, and among the factors that significantly and positively influenced emotional evocation, usefulness had the greatest influence.

From the model, it can be seen that when perceptual fit exerts a mediating effect, it is a full mediating effect, while when emotional evocation exerts a mediating effect, usefulness can still directly and positively influence environmental willingness, indicating that emotional evocation has a partial mediating effect [44]. In this study, usefulness refers to the fact that the information provided in the short videos helps users understand environmental policies and benefits and motivates individual users to make environmental behavioral decisions,

TABLE 2 Structural equation model fit results.

Fitting metric	Indicator value	References value	Model fit judgement
Absolute fit parameter cardinality × 2	325.432		
Degrees of freedom df	217		
	1.500	<3.00 (common) < 2.00 (good)	Good
×2/df	0.041	<0.08	Good
Square root of error of approximation RMSEA	0.892	>0.90	Accept
AGFI	0.915	>0.90	Good
GFI	0.027	<0.05	Yes
RMR	0.0369	<0.08	Yes
SRMR	0.973	>0.90	Good
Value Added Fit Index TLI	0.933	>0.90	Good
Value Added Fit Index NFI	0.977	>0.90	Good
Value Added Fit Index IFI	0.977	>0.90	Good
Value Added Fit Index CFI	0.715	>0.50	Yes
Parsimonious Fit Index PGFI	0.838	>0.50	Yes
Parsimonious Fit Index PCFI	0.801	>0.50	Yes
CN	242	>200	Yes

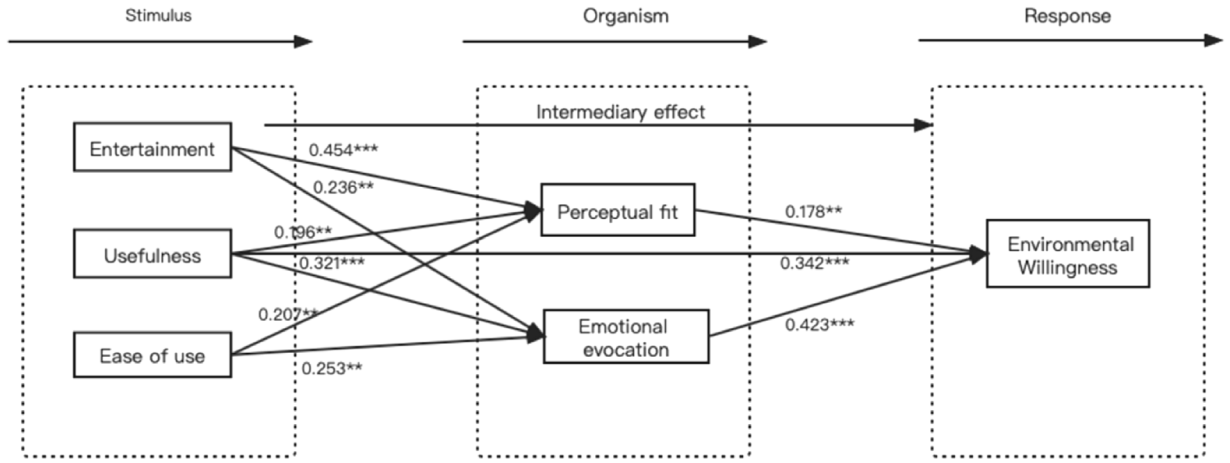

FIGURE 2
Diagram of the model for the study of factors influencing short science videos on individual environmental willingness.

such as purchasing green products (new energy cars, etc.); it also provides users with information on environment-related knowledge, which helps them absorb new information, acquire new knowledge, and master new skills.

Implications for environmental propaganda

This study found that science videos have a significant positive impact on users' environmental willingness. This means that the following aspects can be taken into account to optimize the publicity effect of short science videos.

No environmental advertising, emphasis on knowledge output, and reflecting usefulness

This study found that usefulness has a significant positive impact on users' environmental willingness, and the correlation is strong and has the greatest impact on environmental

TABLE 3 Results of the model analysis of factors influencing science short videos on users' environmental willingness.

Stimulus	Organism	Direct effect	Indirect effect	Total effect	*p*-value
Usefulness	Emotional evocation	0.321	—	0.321	***
Usefulness	Perceptual fit	0.196	—	0.196	0.008
Ease of use	Emotional evocation	0.253	—	0.253	0.004
Ease of use	Perceptual fit	0.207	—	0.207	0.009
Entertainment	Emotional evocation	0.236	—	0.236	0.006
Entertainment	Perceptual fit	0.454	—	0.454	***
Emotional evocation	Environmental willingness	0.423	—	0.423	***
Perceptual fit	Environmental willingness	0.178	—	0.178	0.010
Usefulness	Environmental willingness	0.342	0.171	0.512	***
Ease of use	Environmental willingness		0.142	0.142	
Entertainment	Environmental willingness		0.181	0.181	

TABLE 4 Mediation effect test.

	Environmental willingness		
	Model 1	Model 2	Model 3
Usefulness	0.342***	0.317***	0.268***
Ease of use	0.142	0.202**	0.170**
Entertainment	0.185	0.125*	0.133*
Perceptual fit		0.162**	
Emotional evocation			0.302***
F-value	81.259	64.048	76.271

willingness, which is the key influencing factor of users' environmental willingness.

Usefulness, on the one hand, refers to the fact that short science videos help users understand, compare, and judge environmental behaviors and ultimately make decisions on environmental behaviors; on the other hand, short science videos cannot provide a comprehensive introduction and interpretation of everything but can only select a certain point in the recommended environmental protection, such as a certain point of view, conclusion, story, or scene for interpretation, in essence, by sharing knowledge and information to achieve the purpose of environmental protection publicity. The aim is to share knowledge and information to promote environmental protection.

Therefore, science videos should not be defined as short environmental protection advertisements but should be based on the user's point of view to refine the environmental protection information that can solve the user's pain points and meet the user's needs, in order to share the knowledge information for the purpose. In order to grab the attention of users, science videos must pay attention to the aforementioned influencing factors, meet user needs, solve user pain points, provide users with a new way of thinking, output a new point of view, solve a small problem, share a new skill, and transform environmental recommendations into knowledge output. The distinctive point of view, thought-provoking conclusion, story with twists and turns, and immersive scenes are precisely the important influencing factors that trigger users' likes, attention, sharing, and discussion in the new social media era. Only when users find the ideas, opinions, skills, and techniques shared and conveyed in short science videos useful, will their environmental willingness be enhanced and the effect of short science videos in empowering environmental marketing can be truly achieved.

No environmental preaching and innovative communication techniques to reflect entertainment

This study found that entertainment has a significant positive impact on users' environmental willingness through emotional evocation and perceptual fit and is an important influencing factor on users' environmental willingness. The function of short science videos has changed from environmental recommendation to knowledge output, and the style has also changed. Although it is knowledge output, it is not one-

dimensional and does not include formal explanation and introduction but is interesting and fun for achieving humor and jest so that users can receive ideas, gain knowledge, and master skills in a relaxed and pleasant way. Therefore, the style of the narration, the title of the short video, the text of the release, the actions and expressions of the narrator, and the postproduction effects all focus on the entertainment side. The fact that the content of the short video is interesting or not directly affects the narration style of the narrator and also affects the editing effect of the short video, while the title of the short video and the text of the short video, when it is released, plays a significant role in guiding users' comments.

Popular science short videos are interesting and fun, innovative interpretation is a proven method from the short video content itself, short video titles and short video release copy and can be combined with the current relevant topics, such as social issues, short video platform hot list design creation, some environmental short videos to break the gender stereotypes of men and women, some inspirational short video subverting people's stereotypes of occupation, etc. The effect of humor can be very good.

Not mass communication, serving specific groups, and reflecting verticality

This study found that perceptual fit has a fully mediated effect and has a significant positive impact on users' environmental willingness, hence being an important factor influencing users" environmental willingness. The so-called fit, in the context of short video communication, is the degree to which the knowledge information conveyed in the video matches the user's class orientation and cultural preferences. Therefore, whether in terms of account positioning, content type, or video format, it is necessary to narrow the audience rather than mass. The ultimate goal of short videos is to drive sales for environmental protection, and the subdivision of the environmental marketing vertical is more conducive to strengthening commercial realization. Studies have shown that the more vertical and purposeful the account on the short video platform, the stronger the realization ability. Some accounts that do not have a particularly large fan base have a high degree of stickiness due to their distinctive features, and their ability to realize cash is greater than that of some large pure entertainment accounts. Some short videos based on anchors can be positioned in the direction of IP building by positioning their users and their characteristics and creating a clear and distinctive persona to occupy the minds of users and gain their continuous attention.

In this sense, some environmental organizations should create short video accounts as a branch or even re-categorize their fan base and set up different short video accounts based on the attributes of their fans. For example, for users with some economic power, they can recommend information on new energy vehicles.

No elite education, focusing on the bottom perspective, and reflecting ease of use

This study found that ease of use has a significant positive impact on users' environmental willingness through emotional evocation and perceptual fit and is an important influencing factor on users' environmental willingness. To ensure ease of use, the short science video must be of reasonable length and high definition, Must be focused on the topic, have a clear viewpoint and vivid details, and be able to provide solutions while strengthening the user's sense of immersion. Through detailed portrayal, it strengthens the sense of immersion, establishes a link with users, and triggers emotional resonance; in conclusion, it seeks user attention to continue watching and increases the completion rate; through specific methods, it solves users' pain points strengthens their sense of identity, and carries out knowledge sharing and value output. So, in this sense, the information provided by popular science videos should not be vague but should be able to provide users with a new way of thinking, a new point of view, and a solution to a small problem in every short video.

Instead of an environmental guide, using sound and pictures to create a sense of identity

This study found that emotional evocation has a partial mediating effect and has a significant positive impact on users' environmental willingness, which is an important factor among the factors influencing environmental willingness.

On the one hand, science videos should focus on copywriting, whether it is the text of the short video itself, the cover title of the short video, the release text, or the commentary text, all of which should serve the purpose of inspiring users' emotional resonance and strengthening their sense of identity. The video should also be edited in post-production. Through the combined efforts of the aforementioned elements, users can have a personal feeling of the problems, difficulties, troubles, worries, and pains presented in the short videos, as well as a heartfelt recognition of the beautiful emotions of family, friendship, and love, and a sense of "common experience and the same emotions despite being strangers," thus triggering more likes, retweets, and comments.

Research limitations and future research directions

This study uses questionnaire data to explore the impact of environmental short video features on viewers' willingness to protect the environment and its underlying mechanisms, which can shed some light on existing environmental campaigns. However, there are still some shortcomings in this study,

mainly in the data source. This study uses questionnaire data, although derived from more established scales. However, the findings would be more solid if secondary data could be used to test the research hypotheses. Therefore, in future studies, the use of secondary data could be considered, such as in the well-known short video application—Tik Tok, where a web crawler was used to collect users' behavioral data (e.g., retweets, comments, likes, etc.) to express their environmental intentions. In addition, the dependent variable measured in this study is environmental intention, although in many studies of consumer behavior, intention is used as a proxy variable for behavior. However, we know that environmental behavior is an ongoing behavior. Therefore, just because an audience has environmental intentions today does not mean that their intentions can be effectively converted into environmental behavior over a sustained period of time in the future. Therefore, in future research studies, we can use experimental methods to directly measure the conversion rate of their environmental intentions, i.e., the efficiency of performing environmental behavior.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethics review and approval/written informed consent were not required as per local legislation and institutional requirements.

Author contributions

Conceptualization and methodology, XW and XY; writing—original draft preparation, XW and XY; writing—review and editing, XW and XY. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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