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# Research on the Strategy of E-commerce Anchors from the Perspective of Emotion Regulation: according to the process model of emotion regulation

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**Abstract** The marketing strategy of e-commerce anchors have always attracted the attention of various disciplines because of its great economic value. This paper studies the strategy of e-commerce anchors from four aspects: *situation selection, situation modification, attentional deployment, cognitive change* and *response modulation* in the process of emotion regulation, analyzes the mechanism of e-commerce anchors marketing strategy from the perspective of emotion regulation, and then examines the emotional motivation and attitude reflected behind the two-way interaction between anchors and users. Anchors' public persona is the core of

the situation construction of e-commerce live broadcast. The anchors constructs live broadcast situation that can mobilize the audiences by jointly operating rich public persona symbols with them. At the same time, the anchors' behavior can greatly affect the attention distribution of audiences, and the anchors make adaptive adjustments by implementing user-oriented, brand-oriented, product-oriented and many segmentation strategies. Through the analysis of the cognitive shaping strategy of e-commerce anchors, we find that the anchors' speech promote the cognitive change of audiences and the process of emotional accumulation. When the anchors release emotional information, they encode the information as simply as possible to avoid ambiguity and misunderstanding in the cognitive process of audiences. From the perspective of response modulation, we find that anchors' expression inhibition, expression encouragement and empathy can effectively promote users' decision-making and action. The combination of expression inhibition, expression encouragement and empathy will promote the user's reaction to extend from online to offline, from "minority" to "mass" and realize the "fission spread" of brand influence.

**Key Words** Emotion Regulation, E-commerce Anchors, Marketing Strategy

## 1 Introduction

Emotional regulation is a process in which individuals adjust their own emotions and the environment in order to form an ideal emotional experience. (Gross, 2002) Specifically, emotion regulation includes the process that individuals decide which emotions they have, when they have them and how to experience and express them. To explain the process of emotional regulation, Gross proposed a process model of emotion regulation. He divided the process of emotion regulation into five links: *situation selection*, *situation modification*, *attentional deployment*, *cognitive change* and *response modulation*. Adopting different strategies in different stages of emotional

generation will produce different emotion, cognition and social effects.(Gross,2002)

"According to the 52nd *Statistical Report on China's Internet Development* released by China Internet Network Information Center, as of June 2023, the number of e-commerce live audiences in China was 526 million, an increase of 11.94 million over December 2022, accounting for 48.8% of the total citizens".E-commerce live broadcast has become an important form of online socialization and trade in China.However, at present, the research on e-commerce live broadcast in academic circles is based on the discipline of marketing to study the phenomenon and law of e-commerce live broadcast,less attention has been paid to the emotional regulation in the process. This study pays attention to e-commerce live broadcast from the perspective of emotional adjustment, and analyzes the marketing strategy of e-commerce anchors on the basis of existing theories. Specifically, the anchors's emotional regulation strategy in live e-commerce is mainly reflected in the following aspects.

## **2 The regulation strategy of anchors in situation construction**

"Situation" refers to the environment in which things are conceived or produced. Situation is the breeding ground for emotions and plays an important supporting role in the process of emotional regulation.Situation construction strategy mainly plays a role in situation selection and situation correction proposed by Gross. It is used to meet the audience's macro and micro psychological needs for situational space.In the specific situation of the live broadcast room, the situation construction is mainly reflected in the emotional regulation of the audience by constructing various situations. The shaping of anchors' public persona is the most important part in the process of situation construction.

"Social situation" refers to a specific behavior display occasion with specific

social expectations, which is usually "an elusive occasion decided by social role players and viewers".(Zhou Yong & He Tianping,2018, p.10)In the process model of emotion regulation by James J. Gross(Professor of Psychology Department, Stanford University),*situation selection* refers to individuals selectively entering or avoiding a certain situation when facing different situations, so as to achieve the purpose of controlling emotions.People often use *situation selection* to avoid or reduce the occurrence of negative emotions and increase positive emotional experience.(Gross,2002)*Situation modification* means that when individuals enter a given situation, they adjust some aspects of the situation to make the situation better match their needs, so as to achieve the purpose of emotional adjustment.People often use *situation modification* to further block the occurrence of negative emotions.

For the e-commerce live broadcast room, the anchors' public persona first becomes a basis for audiences to judge the situation. When people make choices, they will give priority to situations that are consistent with their emotions."public persona' means the setting of characters images, which originally refers to the author's setting of characters' family, appearance, personality, dress and modeling in novels, movies and animation works." (Wang Qiannan, 2018, p.94) Then the concept of "public persona" was extended to the field of interpersonal communication.On the one hand, in the e-commerce live broadcast, the anchors' personnel design is an accurate concise and symbolic summary of the anchors' appearance, temperament and speech characteristics.For example,Li Jiaqi's "Lipstick Brother No.1"public persona, Dong Yuhui's "literary talent"public persona and Luo Yonghao's "outspoken"public persona.Anchors 'public persona is the greatest common denominator between anchor characteristics and audiences' expectations, which contains a lot of information, such as social class, consumption ideas, values, political views and so on.The symbol of public persona is the ultimate display and performance of the social and cultural connotation it represents. The symbol of public persona externally reveal the

characteristics that are most easily recognized by audiences in public persona, and spread emotional fragments to audiences. Therefore, the anchors' public persona is the core of the live broadcast situation, and the *situation construction* is carried out with the purpose of matching the anchor setting.

In virtual situation space with the live broadcast room as the unit, the individual's emotion regulatory mechanism also plays a role. Anchors are not only the main factor to urge people to make situation selection, but also an important role to help people complete situation modification. On the one hand, audiences have absolute initiative in the choice of live broadcast rooms. They choose to top or block a live broadcast room, stop or quit a live broadcast room based on their love or dislike of an anchor. They initially completed the selection of situations in the screening of anchors. On the other hand, audiences put forward their own opinions with the anchor on the scene layout, parameter setting and recommended language in the live broadcast room. Through real-time communication, such as barrage, continuous shooting and comment message, audiences guide the live broadcast situation to make corrections that meet their own needs. In the era of digital economy, e-commerce live broadcast has risen rapidly. Internet companies represented by "MeiOne", "QianXun" and "XinXuan" have accumulated a large number of loyal fans by virtue of their mature layout of live broadcast business. Companies such as "East Buy" and "Be Friends" entered the market late, but they soon came into the forefront. Behind the success of these enterprises is the huge influence of the anchor. Therefore, to build a situation that is attractive enough for audiences, first of all, enterprises must cultivate an attractive anchor.

The charm of anchor comes from public persona, it is also an important situational information in the process of mimicry "interpersonal communication" constructed by the live broadcast room. The successful public persona is inseparable from the previous accumulation of the anchor and the subsequent shaping of the

audience. Distinctive public persona can accurately attract audiences and leave a deep impression on the target audiences. On the other hand, the anchor's public persona is managed by users, and the common values and emotional tendency of users re-shape the anchor's public persona. The anchor's public persona is enriched by the constant revision of users. For example, Li Jiaqi, an influential anchor in the field of e-commerce in China, maintains and manages his own multiple personnel in the process of interacting with users. Li Jiaqi, currently a partner of Meione (Shanghai) Network Technology Co., Ltd., deeply binds his own IP with the company's operation, and has over 170 million fans in the whole network. His live broadcast business categories involve beauty, fashion, life, food and other fields, and cooperate with more than 4,000 brands. During the Double Eleven Shopping Festival in 2023, Li Jiaqi continued to operate the popular "Beauty Talent" public persona, and started the live broadcast of the "Beauty Festival" featuring local brands in China on the first day of the Double Eleven. His performance topped the live broadcast list of the day, and achieved a single-day sales of about 9.5 billion yuan. In the live broadcast of "Beauty Festival", Li Jiaqi, the anchor, further consolidated his public persona as a "domestic beauty spokesperson", created products with the brand to enhance the brand's credibility, and escorted the brand with Li Jiaqi's personal IP. By giving more exposure opportunities to local beauty brands in China, Li Jiaqi can awaken the collective consciousness of users' national consumption, further stimulate their national confidence and cultural confidence, and make users identify with local beauty brands in China. Under the promotion of the live broadcast room, the new domestic brand "Proya" surpassed a number of international brands and ranked first in the pre-sale of Tmall Double Eleven beauty products. Domestic make-up brands such as "Florasis", "MGPIN", "Carslan", "Flower Knows", and "into you" are all on the list of "top20 Full-cycle Brands of Tmall Cosmetics in Double Eleven", accounting for over a quarter of the list. At the same time, by building a "Beauty Classroom" in the live

broadcast, anchor Li Jiaqi further expanded his professional design. In the situation of live broadcast similar to "classroom", the relationship between anchor and user has changed subtly. The anchor becomes the "teacher" in the situation, and the anchor's words are more authoritative under the influence of public persona. On the basis of users' trust and even conviction, anchor Li Jiaqi's recommendation on the function, composition and price of products is more likely to attract users' attention. Therefore, the anchors' characteristics build a "skeleton" for public persona, and users expect to fill it with "flesh and blood". The two-way construction of anchor and users makes public persona vivid and attractive. In the e-commerce live broadcast situation, the anchors' public persona is not only an organic part of the situation, but also the most popular "commodity" in the situation. Anchors' public persona firmly attracts users with its unique emotional value and invites users to participate in the co-construction of live broadcast situational space.

In the higher-dimensional situation construction, the anchor's public persona are highly bound to the brand image, thus further adjusting and mobilizing the audience's emotions and attitudes towards the brand in the live broadcast room and even offline. For example, Li Jiaqi, an e-commerce anchor, was once highly bound to the local beauty brand "Florasis" in China. The "traffic bonus" which means the benefits brought by the rapid growth of users to enterprises, brought by the public persona helps the brand to quickly open its popularity, and the subversive consequences caused by the collapse of the anchors' public persona also need to be shared by the brand. The brand "Florasis" was founded in Hangzhou, China. The brand name comes from the poem "Comparing West Lake to West Beauty, both are charming in light dress as well in bright." by Su Shi, a poet in the Song Dynasty of China, which contains the brand's unique thinking on the beauty of women in China. As a frequent guest to the live broadcast room in Li Jiaqi, the brand "Florasis" can always achieve good sales in the live broadcast in Li Jiaqi. However, in a daily live broadcast, Li Jiaqi

took a negative response to users' questions about the price of "Florasis". In an article titled *Behind the Rollover of Li Jiaqi: Not Only the Arrogance of the New Elite* in Sanlian Life Weekly, the brand public relations crisis brought about by the collapse of anchors' public persona is summarized:

"where is it expensive? It's been this price for so many years. Don't talk nonsense with your eyes open. It's hard to make a domestic brand ... Sometimes you need to find your own reasons. Have you worked hard after all these years?"

On September 10th, 2023, Li Jiaqi said these words when he sold a 'Florasis' eyebrow pencil in 79 yuan, which made him lose more than 1 million people overnight. Therefore, a new word 'where is it expensive' appeared in social networks, which satirized his arrogance of not knowing the sufferings of people. There was a comment on Weibo that was praised by more than 500,000 people: 'You earn ordinary people's money, and in the end you ridicule ordinary people's poverty.' At this point, the storm in the live broadcast room has evolved into a modest crisis of public opinion. The day after the incident, he publicly apologized twice, but is it useful to apologize? Judging from the present situation, it is curious that when did he apologize for the third time? After all, looking at his review, it seems that he has not passed the test.

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The first thing people are dissatisfied with is the arrogance revealed in his words: a selling anchor, a selling anchor mainly provides an emotional value in the eyes of many people. He even teaches consumers 'not to talk nonsense with their eyes open'. If you are poor, you'd better 'find your own reasons'. Since he is so "Mansplain", the rebound of public opinion will educate him in turn about who is your God.

Li Jiaqi's success depends not only on his superb sales speech and brainwashing 'Oh my god' and 'Buy it, Buy it', but more importantly, his ability to grasp the consumer's psychology beyond ordinary people----his initial supporters are those "piggy girls" who yearn for exquisite life and pay attention to benefits. If everything he says can't directly hit their real needs, it will be difficult to succeed. From this point of view, Li Jiaqi's right to speak is quite fragile, because his persuasiveness actually comes entirely from speaking for consumers and relying on their approval, without any

compulsion. Although his keen insight and ability to respond to this demand in place is undoubtedly quite powerful, manipulating people's hearts is just another way to use this ability, but in essence, he is still a counter salesman. "

In the case of Li Jiaqi and "Florasis", anchor Li Jiaqi attributed the lack of users' ability to pay to the slackness of users' working attitude, accused users of "not working hard", but ignored the reality of the overall salary reduction in the current economic downturn. This remark shattered Li Jiaqi's long-term image of humility and affinity, and also ran counter to his long-term maintenance of high empathy. The collapse of anchor's public persona aroused the group "rebellious mentality" of users. With the rapid escalation of public opinion, the user's aversion with Li Jiaqi's remarks eventually evolved into a boycott of "Florasis" brand, and the brand image of "Florasis" was damaged seriously. In the nine days after the public opinion incident, the daily sales of Florasis's official flagship store dropped by more than 90%, from more than 1 million yuan to less than 100 thousand yuan. Under the symbolic strategy of anchors' public persona, e-commerce brands should face up to the "traffic bonus" brought by public persona, and should also be alert to the public relations crisis that may be brought about by the collapse of anchors' public persona, and correctly play the role of anchors' public persona.

### **3 The regulation strategy of anchors in attentional deployment**

In Gross's emotion regulation model, attention deployment means that individuals consciously focus on one aspect or some aspects of the situation, or consciously ignore a particular aspect, in order to create an ideal emotional experience. The user's attention distribution is unconscious and instinctive, they allocate their limited attention to areas that can create more happy emotions. Therefore, many important information in the situation is inevitably ignored by users, and those

information are what the brand wants to convey to users. In the specific situation of the live broadcast room, anchors' behaviors adjust user's instinct and shift user's attention to the favorable aspects of the brand by creating a happy emotional experience.

Users' demand is the primary consideration for anchors' attention guidance. Through the incentive mechanism, agenda setting and the dual guidance of hearing and vision, the anchors can effectively mobilize users' attention. The incentive mechanism led by anchors includes behavioral incentive and emotional incentive. Behavioral motivation means that anchors urge users to act in line with brand interests through various incentives. For example, in "BE FRIENDS", an influential live broadcast room in the field of e-commerce live broadcast in China, for example, in "making friends", an influential live broadcast room in the field of e-commerce live broadcast in China, the anchors encourage users to actively shop and participate in barrage interaction by giving out shopping subsidies and organizing hourly lottery. Emotional motivation means that the anchors meet the emotional needs of users to enhance the image of the brand in the hearts of users. For example, in the self-broadcast live broadcast room of China local cleaning brand "Vigor 28", the anchors regularly hold "online shareholders" meetings to empower the relationship with users through regular reports. (Yu Guoming & Ma Hui, 2016) In the live broadcast room, the anchors help users obtain the Internet identity to participate in business decision-making, and get satisfaction and emotional comfort in continuous participation. In order to deeply bind with users outside the live broadcast situation, the anchors use agenda setting to occupy users' eyesight for a long time. For example, in the live broadcast room of the anchor Li Jiaqi mentioned above, the anchor announces the products introduced in the next few hours in advance to extend the time for users to stay in the live broadcast room. In addition, the anchor also guides users to obtain the live broadcast previews and time arrangements of the coming week on the

WeChat applet, deeply binds the live broadcast agenda with users' plan, and continues to gain users' attention outside the live broadcast situation. Only by transforming users' temporary attention into continuous attention can users transform into fans. In addition, the anchors' auditory and visual merchandising can also have a certain impact on the user's senses, thus achieving the purpose of adjusting their attention. In visual marketing, bright colors and iconic elements can help users identify brands quickly. For example, in many live broadcast rooms of clothing, the anchors create the "dopamine" style of themselves and the live broadcast scene by arranging large color blocks and bright elements, which leaves a deep impression on users. In auditory marketing, in addition to the voice of the anchors, the sound generated by the product can also stimulate the user's senses. For example, "live broadcast of immersive eating" stimulate users' appetite by making the sound of food cooking and chewing, which make users curious about the taste and seasoning of food naturally. Combining visual merchandising with auditory marketing can attract users' attention to the greatest extent.

The selling point of the product is the key fulcrum for the anchors to carry out attention guidance. Guiding users to pay attention to the selling points of products is the core demands of brands when they adjusting the distribution of users' attention. Specifically, the anchors need to explore the "brand story" of the product and use the story as an index to arouse the attention of users; Describe the core function of the product, and take the function as a magnet to further attract users' attention; show users' previous comments, look for authoritative endorsements, and guide users to pay attention to distribution again with the neutral voice of a third party; Compare prices, limit time, and realize attention weighting by mobilizing users' nervousness. In addition, the anchors can reduce the distortion caused by filters and fast transitions in traditional video display through the on-site trial of products, restore the product situation more truly, and reduce the worry of "goods are not right" in online

shopping. Adhere to the product-oriented strategy, anchors should adhere to the principle of bottom line and moderation, and shoulder the responsibility of checking. In the pan-entertainment environment, users' attention is sometimes misled by pan-entertainmentism, and they prefer to distribute their attention to humorous and interesting informal topics, obtaining short-term pleasure and illusory satisfaction habitually. Some brands blindly cater to the pan-entertainment environment, and anchors plunder traffic by "playing ugly" and "playing dumb", which has long occupied the attention of users. Their users' aesthetic orientation is distorted into the orientation of appreciating ugliness. "Bad money drives out good", many excellent but low-key brands cannot get the opportunity to enter the public vision. The industry calls for a healthier competitive environment, brands need more equal opportunities to be seen by users, and the loss of entertainment bottom line brings negative emotions such as emptiness and anxiety to society, which hides huge dangers. In the process of e-commerce live marketing, anchor is a tool rather than an end. Only by guiding users' attention back to the product can correctly play the role of anchors and show the products' advantages of the brand.

The logic of brand is the behavioral framework of anchor's attention guidance, and the ultimate goal of attention guidance is to turn users' attention to anchors into brand attention. Take the "EAST BUY" live broadcast room as an example. In an article in The Paper, *My life has not been so outrageous for 30 years. I bought 4 bags of rice in the live broadcast room! Why is Dong Yuhui so Popular?* In the article, the author summarizes the reasons for the "popularity" of the anchor Dong Yuhui and "EAST BUY" :

"While introducing steak in authentic English, he wrote down English words about steak and seasoning packets on the whiteboard, and casually interspersed with a few self-deprecating jokes. 'When I took out this square frying pan, some netizens will definitely say that the pan is the same as my face.' With this talk show-style live

broadcast, the former New Oriental English teacher made people remember his face, which resembled the Terracotta Warriors, and pushed the transforming New Oriental to everyone again. Some netizens commented on Dong Yuhui's live broadcast: I have never been so outrageous in my life for 30 years. I bought 4 bags of rice in the live broadcast room!

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Subsequently, the Oriental selection live broadcast room ushered in explosive growth. In just one week, the number of fans has soared to over 6 million; The share price of New Oriental Online has also soared, once rising by nearly 40%. Some fans in the live broadcast room ridiculed that please place orders by yourself and don't disturb the teacher's lectures.

When introducing commodities, Dong Yuhui switched between Chinese and English freely, telling a series of subtle metaphors, as well as poems and songs that he picked up casually, and from time to time generate's sentences condensed with wisdom. He casually used 'beauty is like a mountain spring, like a bright moon, like the wind through a canyon, like a midsummer night's dream' to describe commodities; He introduced the iron pot, 'It's the mother's hand, the sad face of the father, and the heart of the old man looking forward to his children coming home'. He said that food is connected with life, and that ham is the smell of wind, the smell of salt, and it is made by the magic of nature and time. More time, he talked about history and life endlessly, and also sincerely shared his personal life and feelings with commodities. Facing the ice cream, he thought of his childhood summer, when his mother sent him a melting popsicle. Recommend rice, he tells his rural origin, saying that he witnessed the story behind each bag of rice, and there are hard-working middle-aged people in the long industrial chain. Holding *The Ordinary World*, he shared his different experiences of reading it six times and expounded the truth that 'people have joys and sorrows'. He unpacked a set of Harry Potter, took one book out of the book shell and displayed it on the desktop, shouting, 'Let's go! Go! Set out again!' Turning to the camera, he said that this is an incentive for middle-aged people who are struggling in front of the screen. 'Once, I was a teacher standing on the podium; Now, I am an internet salesman who recommends good things.' In the expression, a teacher's mental journey of transforming to sell goods is

truly revealed, and the sincere expression hits the heart directly. During the period, Dong Yuhui did not forget to remind everyone to click on the attention in the upper left corner, mixed with a few humorous self-teasing, talking and switching to English. He took out a small whiteboard, handwritten various expressions he liked, and conducted English teaching live. In the comment area, netizens spoke their hearts with praise: 'This is a warm and advanced philosophy class.' A live studio where you need to take notes.' It seems that I paid the tuition and was given something extra.' "

China e-commerce brand "EAST BUY" has always been famous for its romantic temperament and humanistic feelings. In the case of the popularity of "East Buy" live broadcast room, the anchor Dong Yuhui introduced products and shared books with rich knowledge and confident address, which enabled users to gain a flow experience in the pleasure of continuously acquiring knowledge. The behavior logic of the anchor is consistent with the brand logic of "East Buy". While users pay attention to the anchor, they consciously project more and longer-term attention to the brand of "East Buy". On the contrary, in the influential live broadcast room "Three Sheep Network" of Tik Tok platform, the anchor "Yellow at the traffic lights" introduced the products of a high-end beauty brand with ferocious expressions and exaggerated words, and made frequent gaffes. During the live broadcast, she even crossed her legs and squatted on the table. Although the live broadcast attracted a lot of attention, it also caused the real target users to resent the brand. The user's attention reached its peak in a short time, but it quickly passed away. Therefore, brands should not blindly chase traffic when choosing anchor recommended products, but should investigate the characteristics of anchor information sources and choose the anchor candidate comprehensively that is most suitable for the brand. (Meng Lu, Liu Fengjun, Chen Siyun, Duan Shen, 2020) At the same time, e-commerce anchors should also strengthen their self-discipline when recommending products, and adjust their behavior at any time to adapt to brand requirements.

## 4 The regulation strategy of anchors in cognitive change

"Cognition" refers to people's general views and opinions on things, including people's perceptions of both positive and negative aspects of things. People's cognition has the dual characteristics of stability and flexibility, which is reflected in the fact that once cognition is formed, it will not change easily. However, with the change of subjective and objective conditions, people can make necessary adjustments and minor changes to adapt to the new situation. In Gross's emotional regulation model, "cognitive change" refers to the individuals' adjustment of the meaning judgment of emotional events to make it conform their own interests. In the live broadcast of e-commerce, anchors often adjust the intensity of the audience's emotional response through guidance, or change the nature of emotions in order to make adaptive responses to perceived opportunities and challenges (Gross, 2002).

In the e-commerce live broadcast situation, the anchors evoke users' positive emotions through cognitive establishment strategies. The anchors throw out ideas and extend users' cognition based on ideas. Take the live broadcast room of star anchor Yi Nengjing as an example. In an article entitled "Yi Nengjing's late-night live broadcast made me cry again" by WeChat official account, a "xiaohongshu e-commerce", it was mentioned that:

"On October 28th, 2023, the second live broadcast of Yi Nengjing, the beauty and skin care buyer of Xiaohongshu, was watched by 1.66 million people, and the average watching time of fans was 12 minutes and 52 seconds. Eleven international brand items with low volume in China were sold out in the live broadcast room. Without the experience of success and the long-lasting echo of eulogy, Yi Nengjing sat at her desk, chatting and telling stories, and with her distinctive discourse system, she took the excellent products selected by her, became 'new species' in the healing economic track together, gentle but fierce.

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In the scene construction, from the first scene of "a room for one person" to the second scene of 'a desk with Beauvoir', the scene of Yi Nengjing's live studio always revolves around the individual's inner space, and even constantly explores the needs of emotional subdivision. In the emotional resonance connection of the scene, the need for healing is not from suffering, but to treat one's heart correctly and find an outlet for deep value exploration. Whether it's the first 'girls should have a sense of being worthy' or Beauvoir's feminism in the second, Yi Nengjing used the identity of bearer to explain her life experience and tell the female audience the power of freedom and autonomy. Longevity, Spiritual Symbol, Speak for Me, Individual Independence, etc. The labels given by these fans are the projection of brand-new Yi Nengjing, and these labels also add unique emotional value to the goods in the live broadcast room, making the live broadcast room a unique "healing space" for the Double Eleven Shopping Festival.

If 'madness' is the emotional outlet of young people, then Yi Nengjing's live broadcast is a new way to relieve emotions. When introducing healing products, such as the high-end spa brand 'Temple Spa' from Britain, she sublimated from the superficial and cinematic picture description to the life philosophy of the sensitivity of one's inner feelings and the dullness of external evaluation'. Yi Nengjing smoothly associated the emotional value of the brand with the emotional problems that consumers were concerned about, and consumers found a sense of resonance and paid for their healing needs.

Yi Nengjing's second live broadcast achieved double sales. Thanks to her selection of products and scene-based live explanation, she has insight into some potential needs of current consumers-releasing and controlling negative emotions, releasing work and study pressure, improving sleep quality, preventing mental illness and improving social skills. In Yi Nengjing's live broadcast 'Healing Space', the emotional value she gave to the goods just met the audience's demand for an "outlet" for psychological healing. "

In the case of anchor Yi Nengjing, Yi Nengjing connected the products in series with stories she experienced personally, deeply rooted the self-esteem concept of "women should love themselves first" in users' hearts, helped users to establish a positive understanding of the brand through vivid narration, and aroused the healing feelings of users' hearts. Brands are endowed with more romantic and emotional

temperament by the story context, which directly hits the softness of users' hearts.

In the live broadcast situation of e-commerce, the anchors accelerate the accumulation process of one or more emotions of users through cognitive deepening strategy. The anchors push users to maximize their positive emotion by creating positive emotional events, so that users can enhance their goodwill towards goods and reputation for brands in great pleasure. Take China's local sports brand "Erke" as an example. In July, 2021, "Erke" donated 50 million yuan to Zhengzhou, Henan Province, which was affected by the torrential rain, despite years of losses. "Erke" touched thousands of users with the social responsibility of national enterprises, and the positive image of "the light of domestic products" was deeply rooted in people's hearts. In September, 2023, "Erke" live broadcast room continued to exert its strength. The anchor promoted other domestic brands in the live broadcast room through the linkage live broadcast mode of "domestic products". An article in Jiupai News entitled *Holding shoes and washing hair with 'Bee&Flowers' in the live broadcast room, 'Erke' responds to "cross-industry sales* summarizes Erke's cross-industry marketing:

"Since the incident of Li Jiaqi and Florasis' continued to be serious, after 'Bee&Flower' launched the 79 yuan care suit, many domestic brands such as 'MIXI ice cream&tea' and 'Bai Xiang' came to the live broadcast room of Erke's official flagship store to earn enough attention. Some netizens ridiculed: 'A brand has fallen, and thousands of domestic brands have risen.' On the evening of September 13th, Erke started the live broadcast of domestic brand "Alliance" with goods, and several anchors collectively "Cook", shampooing their hair with 'Bee&Flower', drinking 'MIXI ice cream&tea' and 'Huiyuan Juice'.

According to incomplete statistics, there are more than ten domestic brands appearing in the live broadcast room of Erke 'that night, such as 'Bee&Flower', 'MIXI ice cream&tea', 'Huiyuan Juice', 'White Rabbit', 'BaiXiang', 'The Godmother', 'Nanfang Black Sesame Paste', 'Wei Long', 'WaHaHa' and 'Longrich'. In addition, the live broadcast room of the official flagship store of 'Bee & Flower' also interacted with 'Erke' online, and the related contents published by the accounts of both parties even included such terms as 'Lovers', 'Light of Domestic Products' and 'Trade War'. That night, 'the dream linkage between Bee& Flower and

Hongxing Erke' rushed to the fourth place in the Tik Tok hot search list. At the same time, Hongxing Erke also put on the "79 yuan Package" in the live broadcast room, and many sports shoes only need 79 yuan. Previously, when Li Jiaqi, the head anchor, sold Florasis's eyebrow pencil with a price of 79 yuan, he made a slip of the tongue, saying that the eyebrow pencil was not expensive. After the calculation by netizens, according to the sales method of the live broadcast room, the average price of this eyebrow pencil is about 329 yuan per gram. The live broadcast of the "Alliance" linkage also won the audience's favor for 'Erke'. On the afternoon of September 14th, the live broadcast room of its official flagship store ranked first in Tik Tok's 'Sports Outdoor List', and the live broadcast of Tmall flagship store was watched by nearly 160 thousand people. "

In the case of "Erke", "Erke" unites other brands with its own appeal, continues to show the social responsibility of national enterprises, and further deepens users' positive cognition of brands. In the first live broadcast of "Domestic Brand Alliance" in 2023, the total number of viewers in the live broadcast room of the official flagship store of Tik Tok platform, "Erke" reached 5.976 million, and the sales increased from 500 thousand yuan to nearly 5 million yuan.

In the e-commerce live broadcast situation, the anchors maintain the user's emotional valence through cognitive maintenance strategy. Cognitive maintenance strategy refers to the anchors' cautious release of emotional information, coding the information as simply as possible to avoid ambiguity and misunderstanding in the user's cognitive process, so as to avoid users' emotions that are not conducive to product sales and even negative emotions to the brand. Different interpretations of users' personal meanings bring different cognition and trigger different emotions. A negative case is the live studio in Li Jiaqi mentioned above. During the live broadcast, Li Jiaqi, the anchor, once referred to the girls whose economic strength was not enough to support the exquisite life as "piggy girl". When he explained the expensive beauty products, he made a hint that "the next products are only for wealthy women to listen to, and 'piggy girl' don't buy it." In view of the title of "piggy girl", some users

think that the anchor also considers the mood of girls with average economic strength when introducing products, and the title of "piggy girl" reveals a little cuteness, which in turn triggers their feelings of "happiness" and "interest". Others think that it is an untimely offence to compare a girl with a pig, which just reflects the arrogance of the anchor, and then triggers the emotions of "anger" and "disgust".

## 5 The regulation strategy of anchors in response modulation

When the audience's emotions have been formed in the live broadcast room, the anchor can still adjust their emotions through a series of strategies. Gross divides emotional regulation into two aspects: *antecedent-focused emotion regulation* and *response-focused emotion regulation* according to the fact that emotional regulation occurs before or after emotional response. Among them, the links such as *situation selection, situation modification, attentional deployment, cognitive change*, which occurs before the emotion generated, are called antecedent-focused emotion regulation. While, *response modulation*, which occurs after emotional generation, is called *response-focused emotion Regulation*. (Gross, 2002) Specifically, *attentional deployment* refers to intervening the possible reaction tendency in the middle zone between emotion and reaction to adjust the emotional experience. Gross divides the individual's reaction tendency into three types, namely, psychological experience, behavioral response and physiological response. In the situation of e-commerce live broadcast, the anchors intervene the three reaction tendencies of users through a series of regulation strategies, which are to make users have trust in the brand, stimulate users to buy, subscribe and share, and make users feel excited and stimulated.

In the e-commerce live broadcast situation, the anchors suppress the user's unfavorable expression tendency to the brand through the expression suppression strategy. (Gross, 2002) Through reasonable guidance, the anchors help users to dispel

polarized emotions and restrain the reaction intensity of negative reactions. Some users have a bad impression on the brand in the link of *cognitive change*, are eager to vent their emotions and seek recognition through negative expression, which often causes incalculable damage to the brand image. Take the "EAST BUY" live broadcast room as an example. An article in Sanlian Life Weekly is entitled "*Worker Dong Yuhui Drives CEO .Has the times changed?*" The article mentioned the "Short Composition Incident" that caused the "EAST BUY" to fall into the storm of public opinion:

"On December 5th, Dong Yuhui warmed up the live broadcast of the 'Journey to Jilin' series in the video, which brought the audience's enthusiasm, but the 'East Buy' official blog suddenly declared that it was not just Dong Yuhui's credit, because we are a team! Every time a small composition is made, the anchor is in front of the camera, and behind it are the partners of the copywriting team, the shooting team and the editing team. Everyone works together to get a special short composition.

.....

Looking back on the whole incident, the dispute over the division of labor of short composition can only be regarded as a small fuse. Subsequently, the editor repeatedly explained that CEO Sun Dongxu's response was commented as an insincere meeting for netizens, and the another anchor Tianquan's shoot 'users in the comment area in the live broadcast room. Almost every round, it is like raising the bomb to an order of magnitude, then directly throwing it into the public opinion field, and finally triggering a crisis that can be called "nuclear explosion" for a company.

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Whether it's the rollover in Li Jiaqi or this incident, we can see that if we don't empathize with consumers, the consequences may be quite serious if we oppose them or criticize them. The reason why Dong Yuhui won the hearts of so many consumers is that he has a high emotional intelligence and can stand in the position of consumers, with an equal perspective and empathy. Whether the editor, anchor Sun Dongxu or anchor Tianquan, they all ignored the fact that the primary goal of their communication is to save consumers, rather than openly discussing right and wrong and proving that 'I can do it'—such a strong argument will only

arouse the audience's greater resentment. "

In the case of Oriental selection, the handling methods of anchor Sun Dongxu and anchor Tianquan not only failed to appease the emotions of the audience, but aggravated the situation. It can be seen that confrontation with the audience can not only inhibit the expression of negative emotions, but also promote the expansion of negative emotions. Then, how should the anchor treat those users who have a bad impression on the brand in the cognitive stage? We believe that anchors often adopt "face up" and "ignore" attitudes when facing negative emotional events. On the one hand, the anchor reduces the reaction intensity of users' negative emotions through appeasement and compensation. For those users who are dissatisfied with the product's quality, the anchor provides in-kind compensation scheme through customer service staff and puts forward the solution of "conveying improvement suggestions to the product manager" to better resolve the negative emotions of users. On the other hand, the anchor avoids participating in negative topics and isolates the negative reaction of users from the live broadcast situation. The "Oriental Selection" live broadcast room was once caught in a storm of public opinion, and the anchor selectively replied to the barrage content to avoid mentioning negative emotional events and prevent the user's emotions from intensifying, thus achieving the goal of stabilizing emotions.

In addition, the anchor encourages users to respond positively to the brand by expressing incentive strategies. Anchors help users to awaken potential emotions through suggestions and appropriate rewards, so that users' response intensity to positive responses can be improved. Users have a good impression on the brand in the link of *cognitive change*, hope to express their support and love through positive behavior, which can bring economic benefits and favorable reputation to the brand. Take the "East Buy" live broadcast room mentioned above as an example. For those users who have a good impression on the brand in the link of *cognitive change*, the anchor guide them in line with the brand interests. In the live broadcast room,

anchor Dunton provides suggestions on purchasing oranges according to users' taste preferences of "sour" or "sweet" to help users complete the order of target goods. Moreover, anchor Dunton randomly selects lucky users from the users who have already purchased to provide free of charge, so as to encourage users to actively shop. The anchor Dunton encourages users to "subscribe" or "set the top" of the live broadcast room, creating conditions for users to enter the live broadcast situation next time.

In the live broadcast of e-commerce, the anchors gain the trust of users through empathy strategy. The anchors stand in the user's position and moderately control the intensity of user's emotional response. In the era of common loneliness, users expect more warm and humanized live broadcast situations, and establish new contacts with others in the live broadcast. (Sherry, 2011) Specifically, the anchor should maintain a humble and sincere attitude, respect and understand the users, and "resonate on the same frequency" with them. Take the local cleaning brand "Bee & Flower" in China as an example. An article in People Online's Daily Public Opinion Data Center entitled *How Popular Domestic "Bee & Flower" come to the Road of "Top Traffic"* tells the details that "Bee & Flower" are known to more people by empathy strategy:

"After the recent inappropriate remarks of e-commerce anchors led to loss of fans, the 'Bee & Flower' who rushed to 'spill the tea' immediately left a message in the relevant video asking 'Can I pick up fans?' Subsequently, the official live broadcast room of 'Bee & Flower' in Tik Tok put on the 79 yuan package overnight, and then its official Tik Tok account also posted a video message: 'What can you buy by spending 79 yuan in the live broadcast room of 'Bee & Flower'? The frank 'wave to ride' behavior of 'Bee & Flower' has been ridiculed by many netizens as 'the most unpretentious business war'. On the same day, 'Bee & Flower' was connected with four trending topics in Weibo, and # Bee & Flower Business War # topped the list of trending topics, with a reading volume of over 260 million, which lasted for 5.6 hours. While the number of fans on its official account has increased rapidly, sales have also achieved a leap. So far, a number of products have been sold out.

As early as a month or two ago, there was a rumor on the Internet that

the'Bee&Flower'picked up boxes for packaging and delivery. Many netizens shared that the express boxes they received was from other brands, so'Bee &Flower'set up a brand that was poor and cannot afford boxes.It is also reported that the'Bee&Flower'does not have its own express boxes, but picks up other brands' express boxes everywhere. These rumors make the majority of netizens feel that the bee flower is poor and pitiful, expressing sympathy.On the other hand, it also confirms that'Bee&flower'pay great attention to environmental protection.This rumor spread quickly on the Internet, combined with the news about the 'wave to ride'of 'Bee&flower', 'Bee&flower'picking boxes 'became a trending topic again.The staff of Bee Flower then clarified this rumor, saying that there were not enough boxes last year, and now they have their own express boxes. However, this fact did not affect netizens' love for bee flowers. On the contrary, it made them increase their sympathy and support for 'Bee&flower' and place orders quickly."

Grasping the popular negative emotional events of "anchor Li Jiaqi and "Florasis", Bee& Flower provides users with a space to vent their negative emotions.The anchor's high empathy has greatly won the goodwill of users, allowing users to consciously support the brand by placing orders.The topic marketing of "picking up boxes" has aroused users' desire for protection and made users attached to the brand.Meanwhile , under the spontaneous exploration and sharing of users, positive live broadcast topics such as "Bee &Flower has been established for 36 years without any punishment record" and "Bee&Flower responds to rumors of bankruptcy" have repeatedly been searched, attracting public attention widely.

Combining the expression motivation with empathy strategy, the anchor promotes the extension and diffusion of user response. Reaction extension requires brands to cultivate internet thinking, integrate online and offline resources and expand their influence. Reaction diffusion requires brands to pay attention to interpersonal communication and accelerate the transformation from "minority" to "mass".The combination punch of the anchor's strategy can extend the user's response from online to offline, from virtual to physical. Spread the user's response to a wider range of people and realize the spread of brand influence. Take the "EAST BUY " live

broadcast room as an example. An article published on Xinhua Net called: *What did the "East Buy" bring to Hebei after 6 days of live broadcast?The article mentioned East Buy 's special live broadcast in Hebei:*

"From humanities to nature, there are many places to play in Hebei."Hebei is a place especially suitable for everyone, where you can enjoy delicious food, beautiful scenery and inner happiness.'On the evening of November 23, the last live broadcast of'East Buy'in Hebei ended.Yu Minhong, the founder of 'East Buy', in the summary of his trip to Hebei, deeply recommended to the whole network that "it's so close, so beautiful, so go to Hebei at the weekend".6 days, 4 cities, 25 tourist attractions ... From November 18th to 23rd, 'East Buy'entered Hebei, and introduced Hebei's profound history, culture and local customs to the audiences of the whole network by live broadcast of'cultural tourism+e-commerce'. Meanwhile,he strongly recommended agricultural and sideline products, tourism commodities and other good things in Hebei.

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From November 19th to 23rd, Yu Minhong led Dong Yuhui, Feng Feng, Xiao Han and other anchors into The zhaozhou bridge, Longxing Temple, Rongguo Mansion in Shijiazhuang, Learning Walk Bridge and CongTai Park in Handan, Mount Langya and Wuqiao acrobatics world in Baoding. In these places, the anchors narrated the profound and splendid culture of Hebei, and let the netizens experience the cultural charm of Hebei in an immersive way.

On November 20th, the live broadcast of Yu Minhong and Dong Yuhui was even more popular, with 100 thousand people online during the peak period. In the live broadcast, Dong Yuhui opened a box of peanut crisp candy of'Tangshan Feast', and when Yu Minhong picked up a piece and didn't finish it, the backstage showed that the peanut crisp candy had been snapped up. Wei Yongzhi, deputy general manager of 'Tangshan Feast', who is watching the live broadcast, sighed: "It's careless, the pre-judgment is insufficient, and the stock is less.'East Buy'has brought a large wave of traffic with high money content and emotional content to Hebei through the live broadcast that attracts fans, and its online and offline influence is huge. Statistics show that during the event, sales reached nearly 100 million yuan, and the number of live viewers exceeded 150 million."

The anchor explained the profound Hebei culture, awakened the audience's love for the homeland, and stimulated their desire to express while rendering their

emotions. Audiences from all over China have left messages "Unexpectedly, Hebei is such an undervalued treasure!" "I heard it in Jiangxi, and I listened. I will take my children to Hebei during the winter vacation." "Shenzhen heard, I will leave for Hebei immediately!" "Yunnan heard it! So close, so beautiful, I will go to Hebei at the weekend." "This special live broadcast not only achieved a sharp increase in product sales, but also made the beauty of Hebei remembered by more people through the live broadcast room, which promoted the sustainable development of Hebei tourism.

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【Editor】 Xie Jiyu

# The Anti-Licensing Effect in Environmental Behavior: A Case of the Ant Forest

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**Abstract** Promoting the sustainability and systematic of individual environmental behavior is one of the important goals in the field of environmental behavior research, but environmental behavior may have inconsistent moral licensing effect. In this research, 425 players of the Ant Forest were investigated to examine how game playing affects their subsequent intention of environmental protection. A mediated moderation model shows that the extent of the Ant Forest use is positively correlated with the intention of pro-environmental behavior, and the pro-environmental satisfaction mediates this process. Collective values have a negative moderating effect on the mediation path. Instead of a licensing effect between the Ant Forest use and subsequent pro-environmental behavior intention, there is an anti-licensing effect in the context of collectivism. Our study contributes to

the understanding of the consistency and influence mechanisms of individuals' pre- and post-environmental behavior, and provides empirical evidence for the incorporation of gamification into environmental education strategies.

**Key Words** environmental satisfaction, pro-environmental behavior, Collective values, Ant Forest, licensing effect

## 1 Introduction

Improving the ecological environment requires promoting the systematic and continuous of citizens' pro-environmental behaviors. One of the goals of environmental psychology is to advocate for individuals to engage in environmentally friendly behaviors (Schultz, 2014). Studies found that the impressions formed by past behaviors can affect subsequent behavioral decisions (Khan & Dhar, 2006), for example, past environmental behaviors may promote or inhibit subsequent environmental behaviors (Geng et al., 2016). Although cognitive dissonance theory suggests that people tend to keep their own behavior consistent (Festinger, 1957), meaning that when they act as environmentally friendly before, they will maintain such behaviors later, which is supported by relevant research (Thøgersen, 1999). Recent research has found inconsistencies in individuals' behavior, this phenomenon known as the 'moral licensing effect' or the 'licensing effect', whereby past environmental behavior inhibits future environmental behavior (Geng et al., 2016). However, there is no clear consensus on the consistency of people's pre and post environmental behavior, or the conditions under which the consistency or licensing effect occurs, so the difference between pre and post environmental behavior may be contextualized.

Given that existing research has focused on the general psychological mechanisms underlying the licensing effects of environmental behaviors, there has

been insufficient examination of the context, for example, less attention has been paid to how external stimuli such as media use or game playing interact with individual characteristics to shape individual perceptions and subsequent environmental behaviors. This study aims to examine the impact of external stimuli on individuals' environmental behavior and how it contributes to future behavioral tendency in conjunction with individuals' internal attributes.

This study explores the effects of a virtual online game on environmental protection, using the Ant Forest as an example. Specifically, is it likely to create misperceptions about individuals' participation in environmental behaviors in the game, which in turn reduces real-life environmental behaviors as a result of the licensing effect? Or is it possible that users' low-carbon behavior is motivated solely by the desire to win the game, and therefore less likely to foster spontaneous environmental behavior in daily life? Or because users have achieved a certain level of achievement in the game, they are subsequently motivated to maintain real-life environmental behavior? These questions will be relevant to the exploration and assessment of the practicality of new forms of environmental communication and environmental literacy development.

## **2 Literature review**

### **2.1 Ant Forest and pro-environmental behavior**

Ant Forest is an environmental game launched in August 2016 by the Alipay app, which tracks the carbon footprint of users' low-carbon behavior in real life (e.g., taking bus instead of driving) and calculates it into a virtual carbon account, called "energy (Nengliang)" in the game. Through the accumulation of 'energy', users gain the qualification to plant real trees in remote areas. All qualifications are claimed by NGOs and eventually planted in desertified areas of western China. By September

2020, over 223 million trees will have been planted through Ant Forest, covering an area of 204,000 hectares (Lieyunwang, 2020-09-16).

With more than 500 million users in the three years since its launch, the game has attracted the attention of academics. Related research has considered it as a new type of environmental communication, examining the elements of its success, or its impact on individual behavior. For example, researches have either examined the motivations for playing or explored the impact of game playing on users' perceptions, intentions and behaviors (e.g. Chen et al., 2020; Chen & Cai, 2019), and one of the concerns of these studies is the continued playing of Ant Forest (e.g. Zhang, Xiao & Zhou, 2020).

The aim of Ant Forest is to engage individuals in environmental protection through gamification. On the one hand, it promotes low-carbon behaviors among users, and on the other hand, it changes desertification by planting trees. Therefore, when considering the behavioral effects of the Ant Forest, it is important to examine the environmental impact (e.g. offline green behavior) in addition to the media aspects (e.g. continued playing). Wang and Yao (2020) explain how the gamification elements of Ant Forest stimulate users' environmental behavior in terms of task design, social interaction, feedback, and reward mechanisms.

The accumulation of energy in Ant Forest must be coupled with specific real-life green behaviors, individuals' environmental behavior may therefore be influenced by game incentives, i.e., adopting certain green behaviors simply for the sake of gaining virtual energy. Without the incentives of the game, the willingness of individuals to protect the environment is key to the sustainability and systemic nature of green behaviors, which is the focus of this study.

## **2.2 licensing effect and environmental behavioural (in)consistency**

Pro-environmental behavior is holistic and continuous, and is closely linked to

people's ordinary lives (Geng et al., 2016). Daily behavior may have a crucial impact on the environment. Therefore, whether past pro-environmental behavior promotes or inhibits future pro-environmental behavior has become the focus of relevant research.

Although relevant research has found that individuals have a strong desire to maintain consistency in pre- and post-behaviors (e.g., Thøgersen, 1999), as cognitive dissonance theory suggests (Festinger, 1957). Other studies found that people who have previously engaged in pro-environmental behaviors may not do so subsequently (e.g., Tiefenbeck et al., 2013). For example, when consumers buy a green product, they are significantly less likely to engage in subsequent pro-environmental behaviors (Meijers et al., 2019).

The moral licensing effect (or licensing effect) is then used to explain inconsistency in behavior (Miller & Effron, 2010). That is, by acting in what is considered to be moral, people award themselves a psychological 'license' to behave in an unethical manner afterwards. Permission effects do not only exist in the same domain, just as previous environmental behaviors inhibit future environmental behaviors, but can also occur in cross-domain behaviors (Monin & Miller, 2001). For example, previous donations to charity inhibit subsequent environmental intentions (Meijers et al., 2015).

Therefore, there is no consensus conclusion on the consistency or otherwise of environmental behaviors. The proposed licensing effect implies the complexity of individual pro-environmental behavioral decisions and the fact that there is no universal, general mechanism for determinants of pro-environmental behavioral tendencies. The important thing is that the moral licensing effect found in environmental behavior research may raise concerns about the potential long-term impact of environmental promotion strategies on individual environmental behavior, resulting in a lack of sustainability of individual environmental behavior. Thus, it is critical to investigate in what contexts individuals' environmental behavioral decisions

can be interpreted in terms of licensing effects, whether the moral licensing effect can broadly explain the environmental behavioral decisions of particular people, such as players in Ant Forest, and how to understand the mechanisms of environmental behavioral decisions. When playing Ant Forest, individuals accumulate energy for themselves through low-carbon actions, which is equivalent to completing a previous moral behavior. According to behavioral consistency or licensing effect, former ethical behaviors will have an impact on later ethical behaviors, our research question is:

*H1: How does playing Ant Forest affect future pro-environmental behavior intention which are not related to the game afterwards?*

There are three different mechanisms for explaining the licensing effect. One is the moral credit model, which argues that individuals who have acted ethically in the past can accumulate their own moral credibility to offset or balance the moral debt associated with unethical behaviors later, leading to acceptance of unethical behaviors by themselves or others (Miller & Effron, 2010). The second is the moral credentials model, arguing that previous moral behavior can glorify subsequent immoral behavior by interpreting the immoral behavior as moral and thereby gaining psychological license to behave immorally (Monin & Miller, 2001).

This last explanation points out that people set goals for their behaviors and that when sufficient progress is made or goals are achieved, individuals shift their energy and focus to other logically separate and competing goals, thereby inhibiting commitment to the original goal. Geng et al. (2016) found that individuals who focused on environmental progress had significantly lower intentions to engage in pro-environmental behaviors after green consumption, implying sufficient progress was made.

In Garvey and Bolton's (2017) work, individuals who purchased green products gained psychological satisfaction with their environmental goals and reduced other

green behavioral intentions afterwards. Urban, Braun Kohlová and Bahník (2020) operationalize the satisfaction of making progress on environmental goals as the perception of doing enough for the environment, and found that recalling past environmental behaviors could positively influence this perception. It is reasonable to assume that previous environmental behaviors can enhance the satisfaction of environmental goals.

In this study, based on the rules of Ant Forest, the accumulation of energy requires offline low-carbon behaviors. The goal of the game is achieved when users accumulate energy and exchange it for a planting certificate. Either the low-carbon behaviors or getting the online certificate which means planting trees in remote areas of China, to some extent it also reflects the individual's progress towards an environmental goal and gaining a sense of satisfaction, which is environmental satisfaction in this study. Based on the third explanation of the licensing effect, we propose that:

*H2: Playing Ant Forest positively affects users' environmental satisfaction.*

*H3: The environmental satisfaction gained from playing Ant Forest will negatively predict future pro-environmental behavior intention which are not related to the game afterwards.*

### **2.3 the moderation of mediation path: collective values**

Researchers have focused on factors that can interfere with the licensing effect, including motivation, attitudes, values, norms, etc. (e.g., Garvey & Bolton, 2017; Meijers et al., 2019; Urba, Braun Kohlová, Bahník, 2020). Simbrunner and Schlegelmilch (2017) suggest that specific cultural factors may moderate licensing effects in pro-environmental behaviors, but this is not yet supported by empirical evidence.

Hofstede defines culture as the division of the mind that separates one group or

category of people from another. A strong cultural identity is associated with a deep understanding of group values, social norms and certain behaviors that are accepted by members of the community. Individualism and collectivism, as one of the dimensions of cultural values, reveal the fundamental beliefs of individuals regarding their interactions with others, how they perceive group goals, and their perception of the importance of forming a community (Hofstede, 1984). People with individualism tend to maintain their independence and emphasize self-direction, while those with collectivism show a stronger interdependence and collective orientation. Compared to individualism, collectivism focuses more on mutuality, intra-group harmony, family security, etc., and is more context-dependent, valuing the relationship between the individual and others and the group (Miller, 1984; Morris & Peng, 1994).

Hui and Triandis (1986) argue that collective values have three basic dimensions: considering the impact of decisions and actions on others, sharing mutual successes, and sharing mutual failures. Individuals who share collective values show 'altruistic' behaviors. The impact of the natural environment on human existence is beyond the level of individual, pro-environmental behavior is intrinsically linked to collective values. Research found that collective values influence social behaviors, including environmental behaviors (e.g., McCarty & Shrum, 2001; Muralidharan et al., 2017; Kim & Choi, 2005).

China is generally considered to have a culture of collectivism, but this does not mean that all members identify with collective values in the same way. In this study, the rules and objectives of the Ant Forest game are altruistic to a certain extent. Users with weaker collectivist values may feel they have fulfilled their commitment to the environment and therefore slacken their moral behaviors (i.e., other pro-environmental) after completing their initial moral behaviors (i.e., energy accumulation or obtaining virtual certificates), whereas users with stronger collective values do not. Therefore:

*H4: Collective values moderate the relationship between playing Ant Forest and subsequent pro-environmental behavior intention which are unrelated to the game.*

*H4a: Users with low collective values are less likely to engage in subsequent pro-environmental behaviors after gaining environmental satisfaction from playing Ant Forest.*

*H4b: Users with high collective values are likely to engage in subsequent environmental behaviors after gaining environmental satisfaction from playing Ant Forest.*

### **3 Methods and Measurements**

#### **3.1 Methods**

Existing studies have mostly examined the consistency of individual behavior through experiments. However, these findings are driven by experimental procedures and it is difficult to determine whether these findings still occur in real-life conditions. To bridge the methodological gap, Meijers et al. (2015) used a quasi-experimental survey method that allowed respondents to choose their own antecedent behaviors and found the existence of licensing effect. In this study, we also use this method as Meijers and her colleagues do, and conducted a cross-sectional online survey in April 2021 among Alipay users who have played the Ant Forest. A highly reputable market research company in China was commissioned to collect data through its online survey platform. In the end, 514 samples were collected, of which 425 were valid. Table 1 presents respondents' demographic information. STATA 14.0 and SPSS 21.0 were then used for data analysis.

**Table 1** Sample Demographics ( $N = 425$ )

Demography	Category	Number (%)
Gender	Male	246 (57.88)
	Female	179 (42.12)
Age (years)	Under 18	5 (1.18)
	18~24	176 (41.41)
	25~30	162 (38.12)
	31~40	69 (16.24)
	41~50	6 (1.41)
	Over 50	7 (1.65)
Education	High school or below	48 (11.29)
	Bachelor or equivalent	276 (64.94)
	Master or above	101(23.77)
Income (RMB)	Under 5000	260 (61.18)
	5001-10000	111 (26.12)
	10001-15000	40 (9.41)
	Over 15000	14 (3.29)

### 3.2 Measurements

Pro-environmental behaviour intention (dependent variable): Based on existing research and adapted to the Chinese context (Hong, 2006; Hsu, 2017; Shih & Lin, 2017), we created a 9-item scale to measure the likelihood that the respondent will engage in pro-environmental behaviour in the next two months (e.g., "I will talk to family and friends proactively about environmental issues") ( $1 = \text{Completely disagree}$ ,  $7 = \text{Completely agree}$ ) ( $M = 4.52$ ,  $SD = 0.80$ ; Cronbach's  $\alpha = 0.74$ ).

Playing Ant Forest: We asked participants to indicate (1) How long have you been a player of Ant Forest? ( $1 = \text{Less than 6 months}$ ,  $5 = \text{Over 3 years}$ ); (2) How often did you play Ant Forest last week? ( $1 = \text{Less than once per day}$ ,  $5 = \text{Over 10 times per day}$ ). Playing Ant Forest were computed using the interaction term between

length of time as a player and frequency of playing. Standardised score was used in statistical analysis ( $M = 3.79$ ;  $SD = 1.19$ ).

Environmental satisfaction: Referring to Yang et al. (2018), 6 items measured respondents' satisfaction with their perception of doing enough to the environment by playing Ant Forest (e.g., "I'm happy I can improve the environment by playing Ant Forest") ( $1 = Completely disagree$ ,  $7 = Completely agree$ ) ( $M = 4.53$ ;  $SD = .94$ ; Cronbach's  $\alpha = .88$ ).

Collective values: According to Hui and Triandis (1986), collectivist values include the impact of behaviour on others, shared positive consequences, and shared negative consequences. Referring to Chen and West (2008), a 6-item scale was used. (e.g., "I'm proud of the achievements of my parents/relatives/friends") ( $1 = Completely disagree$ ,  $7 = Completely agree$ ) ( $M = 5.50$ ;  $SD = 0.90$ ; Cronbach's  $\alpha = 0.75$ ).

Control Variables: Demographic variables including gender, age, education, and monthly income were controlled.

## 4 Results

To answer RQ, all three regression models in Table 2 are significant, and model 1 shows that playing Ant Forest is a significant positive predictor of pro-environmental behavior tendencies ( $\beta = 0.13$ ,  $p < 0.001$ ). It means that the more users play Ant Forest, the more likely they are to maintain environmentally friendly in their lives in the future. And model 2 shows playing Ant Forest is positively associated with environmental satisfaction, supporting H2.

**Table 2** Regression analysis with environmental satisfaction as a mediator ( $N = 425$ )

Dependent variable	Model 1 Pro-environmental behavior		Model 2 environmental satisfaction		Model 3 Pro-environmental behavior intention	
	$\beta$	<i>S.E.</i>	$\beta$	<i>S.E.</i>	$\beta$	<i>S.E.</i>
Gender (male = 0)	-0.02	0.08	-0.02	0.11	-0.01	0.07
Age	0.10	0.05	0.07	0.07	0.07	0.04
Education	-0.10*	0.04	-0.19**	0.06	-0.04	0.04
Income	0.03	0.04	0.10*	0.05	-0.00	0.03
Playing Ant Forest	0.13***	0.03	0.15**	0.05	0.08**	0.03
Environmental satisfaction					0.32***	0.03
ANOVA	$F(5, 419) = 5.93***$		$F(5, 419) = 5.80***$		$F(6, 418) = 24.97***$	
Adj-R <sup>2</sup>	0.05		0.05		0.25	

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

We then examined the mediating effect through a Sobel test. As shown in Table 3, Both the direct and indirect effects of playing Ant Forest on pro-environmental behavior intention are significant. It means that playing Ant Forest not only positively predicts behavior intention directly, but also positively through the mediation of environmental satisfaction. H3 is not supported.

**Table 3** Mediation Analysis of the Sobel test

Path		Coef.	<i>S.E.</i>	Sobel test
Playing Ant Forest → Pro-environmental behavior intention (Path c)	Total effect	0.13**	0.03	
Playing Ant Forest → Pro-environmental behavior intention (Path c')	Direct effect	0.08**	0.03	0.05**
Playing Ant Forest → Environmental satisfaction → Pro-environmental behavior intention	Indirect effect	0.05**	0.02	

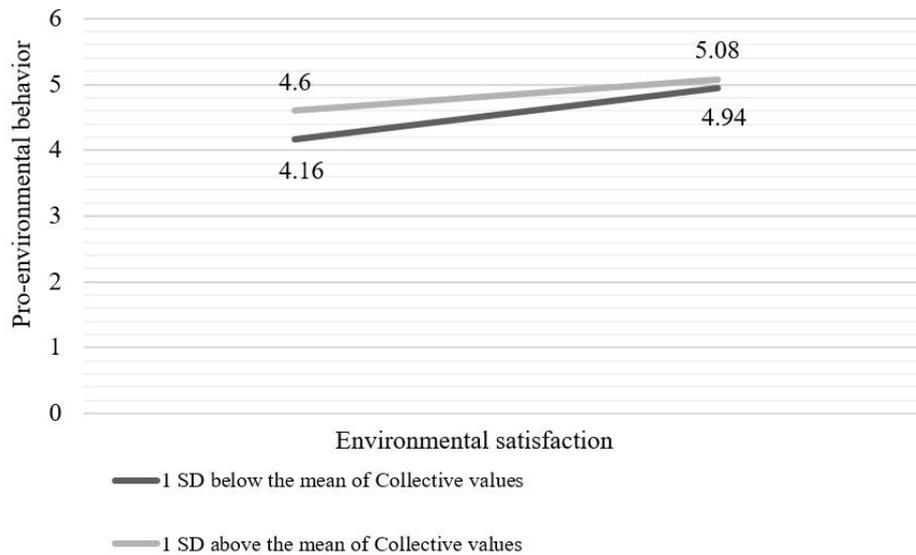
\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

To test H4, regression models were significant in Table 4, and we found the significant interactive effect of environmental satisfaction and collective values ( $\beta = -0.09, p < 0.05$ ). To visualize the moderation effect, we used Process Model 14 to conduct simple slope analysis and produce the figure of the interaction. The results show that the mediation effect of environmental satisfaction still exists in the mediated moderation model. And as depicted in Figure 1, among participants with low collectivist identities ( $M-1SD$ ), environmental satisfaction has a positive effect on pro-environmental behavior (*simple slope* = .41,  $t = 6.94, p < 0.01$ ). Although the above results were also found among respondents with high collectivist identities ( $M+1SD$ ), the effect was much smaller (*simple slope* = .26,  $t = 4.09, p < 0.01$ ). In other words, as individual collective values become stronger, the weaker the mediating effect of environmental satisfaction between playing Ant Forest leading to more environmental behavior. Therefore, H4a is not supported and H4b is supported.

**Table 4** Analysis of mediated moderation model ( $N = 425$ )

Dependent variable	Model 1 Environmental satisfaction		Model 2 Pro-environmental behavior intention	
	$\beta$	$t$	$\beta$	$t$
Gender (male = 0)	-0.03	-0.34	-0.08	-1.00
Age	0.06	1.06	0.01	0.20
Education	-0.17***	-3.37	-0.10*	-2.31
Income	0.08	1.97	0.07	1.80
Playing Ant Forest	0.13**	3.05	0.11**	3.11
ES			0.33***	7.08
CV			0.16***	3.39
ES $\times$ CV			-0.09*	-2.05
ANOVA	$F(5, 419) = 6.25^{**}$		$F(8, 416) = 20.80^{**}$	
Adj-R <sup>2</sup>	0.07		0.29	

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . ES: Environmental satisfaction, CV: Collective values.



**Figure 1** Interactive plot showing predicted values of Pro-environmental behavior as the function of environmental satisfaction and collective values

## 5 Discussion and conclusion

The positive impact of playing Ant Forest on individual behaviors is not limited to the low-carbon behaviors associated with the rules of the game, but also spreads to environmental behaviors that are not related to game returns. The licensing effect implies that pre-moral behavior reduces the intention to maintain similar moral behavior afterwards. In contrast, this study found an anti-licensing effect, which supports the behavioral consistency. The moral licensing effect, as a concept that exists in experimental contexts, may not be applicable to a wide range of environmental activities. Thus, the environmental promotion campaign is not overly concerned that the moral licensing effect may weaken the external stimulus to promote pro-environmental behavior.

In addition to the cognitive dissonance theory, it can also be understood from the perspective of serious game studies. The use of game elements in serious issues such as politics, the environment and health helps to promote civic engagement and broaden the dissemination of information, which is known as the process of gamification. Gamification of Ant Forest includes tasks, feedback, and rewards (Wang & Yao, 2020), these help to increase the user's involvement. Involvement is an unobservable state of motivation and interest in a recreational activity or related product, caused by a specific stimulus and having a drive property (Huang, Johnson & Han, 2013; Iwasaki & Havitz, 1998). Researchers suggest that an involvement in serious games may influence their perceptions of relevant issues (Fuchslocher, Niesenhaus & Krämer, 2011) and drive their commitment to the game (Iwasaki & Havitz, 1998). In this study, involvement was reflected in the extent of playing Ant Forest, and frequent play causes individuals to develop a psychological association with the game and driving individual commitment, which extends even from game-related low-carbon behaviors to unrelated pro-environmental behaviors.

Nor and Azhar (2017) found that a gamification format could stimulate young people to engage in low-carbon behaviors. However, the low-carbon behaviors in their study could not be separated from the game context, that is, the players' low-carbon behaviors offline were to earn game bonus. This raises the key question of whether low-carbon behaviors are motivated solely by the desire for game rewards, and if, without the game's rewards, individuals would still be willing to engage in environmental protection. Our study considers environmental behavior beyond the context of game, concerning the potential de-contextualized, general behavioral effects of game participation. Using a similar approach to Meijers et al. (2015), we found a consistent relationship between game playing and environmental behaviors in a realistic context, suggesting that similar gamification designs could be adopted for environmental education campaigns to enhance effectiveness.

In addition, playing Ant Forest enhances the user's perception of contributing to the environment during the game, that is, the sense of environmental satisfaction, which in turn increases the likelihood of subsequent environmental behaviors. The licensing effect suggests that when people achieve goals in one area, they will turn their efforts to other competing goals, thereby slackening moral behaviors (Geng et al., 2016). Our results are counter to the goal management mechanism of the licensing effect, where the more individuals perceive that they are achieving their environmental goals, the more likely they are to maintain low carbon behaviors and even cast the 'halo' of low carbon behaviors onto non-game related pro-environmental behaviors. We therefore suggest that there may be a motivational effect of pre-moral behaviors, and rather than distracting the individual from those behaviors, the achievement of the goal may encourage the continuation of relevant moral behaviors.

However, this motivational effect exists under certain contextual conditions. Specifically, we found that overall collective values positively moderated the positive mediating effect of environmental satisfaction on playing Ant Forest to influence pro-environmental behaviors, but the moderating effect decreased with higher collectivist identification. Some studies support the idea that individuals with low identification with certain values are more likely to show licensing effects, while those with high identification are likely to show reinforcement effects (Meijers et al., 2019; Mullen & Monin, 2016). The current study, however, shows that instead of licensing effects, there are stronger behavioral consistencies among individuals with low collectivist identity, while the positive mediating effect of playing Ant Forest on pro-environmental behaviors is weaker among individuals with high collectivist identity.

Individuals with collective identities are often driven by social norms and are more concerned with the impact of their behaviors on others (Sinha & Verma, 1987). For instance, they are more likely to recognize the importance of recycling (McCarty

& Shrum, 2001). Guided by collective values that emphasize cooperation and altruism, individuals regard moral behaviors as consistent with collectivism and internalize it as personal norms of conduct. As a result, individuals' behaviors are less likely to be altered significantly by external stimuli. In our study, individuals with high collectivist identities may internalized 'altruistic' behaviors such as environmental protection into their own moral principles, and had an inherent tendency to behave in a consistency way. Thus, motivation from game rewards or the satisfaction of making progress towards environmental goals has relatively little positive impact on pro-environmental behaviors. Conversely, users with a low collectivist identity, who perceive that they are contributing to the environment after playing Ant Forest, are more likely to motivate themselves to maintain pro-environmental behaviors subsequently. Thus, there may also be anti-licensing effects in environmental behaviors under conditions of value identification.

In summary, we found that Ant Forest incorporates gamification elements in the form of environmental communication to engage users in a virtual tree-planting game, and promote their willingness to engage in offline environmental behaviors, especially those unrelated to the rules of the game.

One of the main purposes of environmental education is to develop sustainable, long-term, systematic environmental behaviors in the daily life. Compared to other forms of communication, gamification greatly increases involvement. This not only helps to reinforce individuals' perceptions of environmental issues, but also may influence their behaviors. Serious games, or gamification elements, could therefore become an influential part of environmental communication practice in the future.

In addition, this study found a "anti-licensing" effect of collectivist identity as a moderating variable, that is, the mediating effect of environmental satisfaction on the relationship between playing Ant Forest and environmental behaviors was more prominent under low collectivist identity. Thus, the role of value identity on

environmental behavior is not entirely straightforward and pure, suggesting that the role of value appeals in environmental communication needs to be considered more cautiously.

In summary, although this study does not support moral licensing effect on the general level, this is a good thing for environmental promotion education, implying that by the designed environmental communication stimuli can help to practically promote individuals' willingness to engage in environmental behavior. Our finding also helps to expand the understanding of value identity in environmental behavior decisions. And findings in this research have practical implications for researchers, managers, environmental educators, and environmental communication strategy developers, for instance, it is possible to design suitable environmental communication strategies for individuals with low collectivist identities to motivate them to engage in sustained environmental behaviors by enhancing their environmental satisfaction perception.

Finally, there are some limitations in this study, for example, the survey only can find a general pattern between environmental behaviors and potential influencing factors, future research could investigate how playing Ant Forest affects environmental behaviors and the underlying mechanism by interviewing and other methods.

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**【Editor】** An Miaomiao

# The Impact of Policy Narratives and Attribution on Public Support for Betel Nut Regulation: Investigating the Mediating Role of the Feeling of Pity

© Jiajing Zhai, Jinghong Nie

**Abstract** Cancer advocacy information on social media manages to strike a balance between being scientifically rigorous and captivating public attention through specific narratives. Evidence-based causal arguments play a pivotal role in persuading the audience to embrace cancer prevention information. The framing and tailoring of cancer causality can amplify or attenuate laypersons' risk perceptions, thereby influencing individual cognitive attitudes and behaviors. This study delves into the advocacy effects of cancer news using different types of evidence and attribution. Through a 2 x 2 controlled experiment, the findings reveal that when oral cancer is attributed to different reasons, the persuasive power of anecdotal stories and statistical

evidence are comparable. When oral cancer is attributed to personal reasons, advocacy through anecdotal stories is more effective than probability information. Conversely, when oral cancer is attributed to societal reasons, advocacy through probability information is more effective than anecdotal stories. This process is mediated by the audience's feeling of pity.

**Key Words** Anecdotal Evidence, Statistical Evidence, Cancer Attribution, Feeling Of Pity

## 1 Introduction

In recent years, various studies have explored the role of social media platforms in the policy advocacy process (e.g., Chalmers & Shotton, 2016; Jackson et al., 2021; Smith et al., 2015). Platforms like Twitter, YouTube, and Weibo play a crucial role in mobilizing policy supporters by offering a cost-effective and highly interactive communication channel for advocacy alliances, thereby expanding policy influence (Gupta et al., 2016). Similarly, scholars in the field of policy research increasingly draw theoretical inspiration from the narrative persuasion domain, focusing on enhancing public policy support through narratives (Shanahan et al., 2011). They argue that narratives can effectively boost public policy support by increasing awareness, fostering cognitive engagement, and reducing psychological resistance.

Narrative Policy Framework is a crucial theoretical framework that elucidates the dynamic role of narratives in the policy process (Crow & Lawlor, 2016). It posits that policy actors influence the policy process by simplifying complex policy issues into stories with backgrounds, characters, plots, and moral dimensions (Shanahan et al., 2018). Policy narratives serve as a vital communication tool for governments to persuade specific target audiences and garner public policy support. Especially in the health policy domain involving individual life safety, policy narratives are of

significant importance in influencing the willingness of individual actors.

Currently, the insidious nature of cancer onset and the high cost of treatment make cancer prevention and control increasingly challenging. The significant burden of medical expenses associated with cancer poses a substantial challenge to both society and the nation. Policy narrative strategies are effective tools for conveying policy information, shaping public perceptions, and garnering support. In the formulation and implementation of health-related policies, the public is not only a critical stakeholder but also a decisive factor in the effectiveness of policy outcomes. Public awareness, attitudes, and willingness to support policies directly impact health outcomes and policy effectiveness. Therefore, ensuring the public's understanding and endorsement of policy rationale is crucial. In the context of oral cancer prevention policies, the government can adopt various narrative strategies to engage and persuade the public. For instance, the government can highlight the severity of oral cancer by providing statistical data and scientific research to capture public attention. Simultaneously, the government can enhance the policy's appeal and credibility by narrating real stories of oral cancer survivors.

This study aims to explore the public's willingness to support betel nut regulatory policies, providing theoretical support for improving policy propaganda strategies and dissemination efforts. Specifically, the research focuses on region-specific betel nut regulatory policies, combining the policy narrative framework with attribution theory to examine the support attitudes of residents in Hunan Province, where betel nut consumption is associated with a high incidence of oral cancer. The health damages caused by chewing betel nuts have been thoroughly documented. Medical studies have found that chewing betel nuts leads to chronic oral conditions, such as submucosal fibrosis, which is a significant factor in causing oral cancer. In 2003, the International Agency for Research on Cancer blacklisted betel nuts, categorizing them as a Group 1 carcinogen, alongside tobacco, alcohol, and arsenic. In China, in 2017,

the former China Food and Drug Administration designated betel nuts as a Group 1 carcinogen.

Conducting a survey experiment with 285 participants from the public in Hunan Province, this study aims to investigate the impact of different narrative types and attribution styles in social media articles on the public's willingness to support betel nut regulatory policies. In terms of theoretical significance, by incorporating attribution theory into the narrative policy framework, we reconcile conflicting conclusions in current policy narrative research regarding the persuasive effects of anecdotal stories and statistical evidence. This study establishes the boundary conditions for narrative persuasive effects. Second, introducing regional identity as a moderating variable adds another layer to our findings, emphasizing the influence of regional differences on the relationship between causal attribution and policy support. This perspective contributes to a more profound understanding of the unique impact of local communities in narrative dissemination, inspiring the development of tailored narrative strategies aligned with specific regional contexts.

Furthermore, the study underscores the critical position of emotions by highlighting the mediating role of sympathetic emotions in the narrative process. This finding deepens our understanding of the emotional underpinnings of persuasive storytelling and opens new avenues for future research in related areas. This insight not only enhances our comprehension of how individuals interpret narrative information but also provides valuable guidance for policymakers seeking to effectively leverage causal attribution mechanisms to influence public attitudes, such as adopting different narrative approaches and creating personalized communication plans for diverse target audiences, thereby enhancing policy promotion efforts.

## 2 Literature Review and Research Questions

### 2.1 How Policy Narratives Influence Policy Support

Narratives play a crucial role in shaping public opinion and influencing policy processes by reinforcing audience policy beliefs and transforming audience perspectives (Shanahan et al., 2011). Policy narratives involve the description of background, characters, plot, key decision points, and solutions related to policy issues. Through storytelling, complex information about the causes of social issues can be integrated, thereby enhancing policy support (Lundell et al., 2013). Well-structured narratives can trigger emotional responses from the audience (Oatley & Gholamain, 1997), influence individuals' cognitive thinking about the issue and solutions (Lundell et al., 2013), induce a state of psychological transportation in information receivers (Green et al., 2003), and change individuals' beliefs (Green & Brock, 2000), ultimately shaping public action.

Several studies have confirmed the role of narratives in shaping public opinion and influencing policy support intentions at the individual level. Statistical evidence (such as quantitative data on incidence rates and causative factors) and anecdotal evidence (narrative descriptions and qualitative information) are both narrative types related to policies and are equally important (Brownson et al., 2009). While policy scholars encourage policymakers and researchers to increase the use of narrative evidence in health policy communication to enhance two-way communication, improve decision quality, and promote evidence-based policy (Campbell et al., 2009), there is currently controversy regarding the impact of anecdotal evidence and personal narratives as policy narrative frameworks. Some studies suggest that focusing on individuals in news reporting can evoke sympathy and resonance, eliciting emotional responses from the public (Schelling, 1968; Slovic, 2007; Small & Loewenstein,

2003). However, other research indicates that stories about individuals may lead the public to blame the individuals in the stories for the issues (Barry et al., 2013; Iyengar, 1994).

There are various mediating mechanisms that play a positive role between policy narratives and policy support. Niederdeppe et al. (2013) identified narrative persuasion as influencing policy support through the promotion of complex integration. Specifically, narratives addressing moderate personal responsibility for obesity generate the most complex integration, encouraging individuals to think in more complex ways about the causes and solutions for social problems. This condition is most conducive to promoting policy support. Additionally, the identification with character perspectives in narratives serves as a mechanism mediating narrative and its persuasive effects (de Graaf et al., 2011). Narrative transportation theory suggests that narratives can immerse persuadable individuals into situations, enhancing their perception and willingness to engage. However, chronic individual differences in the likelihood of becoming transported can act as a boundary condition influencing narrative persuasive effects. Specifically, persuasive narratives demonstrated heightened effectiveness, particularly among highly transportable participants. This impact was influenced more by emotional responses than rational evaluations (Mazzocco et al., 2010).

Furthermore, there is conflicting evidence on whether policy narratives have the possibility of unintended consequences or backfiring. Some studies have found instances of backfiring in policy narratives, suggesting that policy narratives may pose a potential challenge or even diminish policymakers' support for legislation. A possible explanatory mechanism is that narratives influence partisan reasoning (Winett et al., 2021). Additionally, two studies have similarly found a backfire or boomerang effect in persuasive messaging (see Byrne & Hart, 2009; Wood & Porter, 2019). Moreover, when explicit persuasive appeals are overlaid in policy advocacy

narratives, it might have unintended consequences because persuasive intentions can trigger psychological reactance (Cho & Salmon, 2007). According to psychological reactance theory, overt persuasive appeals are perceived as encroachments on personal freedom (i.e., perceived persuasive intent), potentially resulting in the rejection of the message (Moyer-Gusé et al., 2019). Furthermore, when narrative content contradicts people's attitudes, narratives may reduce individuals' intentions for advocacy actions (Nyhan & Reifler, 2015). The worldview backfire effect also provides a theoretical explanation for the negative effects of narrative persuasion. Individuals with firmly entrenched worldviews may, when presented with a counterargument, find themselves reinforcing their initial beliefs (Cook & Lewandowsky, 2011; Lewandowsky et al., 2012).

When audiences are exposed to policy advocacy information of different narrative types, they tend to make causal inferences based on the pathogenic factors and health outcomes provided in the information. This study is interested in exploring how the advocacy effects of anecdotal stories and statistical information may vary depending on individuals' different causal attribution strategies.

## **2.2 Attribution Theory**

Negative health events, such as cancer news in media reports, prompt individuals to seek explanations for these events. According to Attribution Theory (Weiner, 1985), the perceived controllability of factors influencing an outcome serves as a causal dimension, influencing the specific explanations or attributions individuals assign to the outcomes of others. Furthermore, the attribution of responsibility affects attitudes toward social issues and support for policies aimed at reducing these issues (McGlynn & McGlone, 2018). Public support or resistance to public policies stems from broader beliefs about individual (internal) and social (external) responsibility (Niederdeppe et al., 2011). On the one hand, health is closely tied to individuals, and each person is

considered the primary responsible party for their own health. On the other hand, scholars argue that since many factors related to health disparities are beyond the control of any individual, a social advocacy approach is needed to achieve the structural changes required to eliminate health disparities.

Attribution theory provides a thoughtful theoretical foundation for exploring narrative strategies in the prevention policy for oral cancer. This theory has long been applied to examine individuals' perceptions of illness. Weiner and his colleagues found that illnesses perceived to be more controllable (e.g., AIDS) attracted more blame, whereas cancer, widely seen as uncontrollable, attracted less blame. Previous research has differentiated two attributions of the cause of depression based on whether individuals are held responsible for it. Different attribution approaches can trigger varied cognitive and emotional responses in the audience, thereby influencing corresponding behaviors (Zhang & Wen, 2021).

Rothman et al. (1993) discovered that internal attributions of responsibility for health-promoting behavior were more persuasive than external attributions in convincing women over 40 to undergo breast X-ray screening. Additionally, Niederdeppe et al. (2011) found that beliefs in social attributions for obesity were related to support for related policies. Specifically, the effects of responsibility attribution on policy support are also influenced by individual political ideology. One-sided, individual stories led to more social cause attributions than two-sided, individual stories. Contrarily, two-sided, community stories produced greater policy support than one-sided, community stories (Niederdeppe et al., 2012).

### **2.3 Attribution of Oral Cancer: Personal vs. Social?**

Cancers are not generally seen as a matter of personal responsibility, but oral cancer does attract blame attributions. Epidemiological research has shown that the prevalence of betel quid chewing in Hunan province was rather high (64.5–82.7%).

Additionally, there was a positive correlation between betel quid chewing and the risk of oral cancer in the Hunan Province, China. According to attribution theory, internal attribution refers to inferences caused by personal attributes within an individual's control. External attribution refers to inferences caused by external factors beyond an individual's control. In the context of oral cancer, some individuals may attribute the issue to internal personal factors (e.g., personal unhealthy lifestyles such as chewing betel nuts), while others may attribute the issue to external social conditions (e.g., the widespread availability of betel nuts in supermarkets).

The advocacy effects differ between personal attribution and social attribution. Niederdeppe et al. (2008) proposed several explanations for why social attribution may lead to advocacy failure, based on the U.S. context. On one hand, solutions driven by social attribution often involve the reallocation of resources, leading to mobilization difficulties. On the other hand, social attribution contradicts the mainstream ideology in the U.S., which emphasizes individual responsibility. Additionally, inherent human biases tend to favor internal attribution rather than blaming social structural factors. Similarly, the focus on personal behavioral causes of diseases is associated with increased support for individual responsibility for healthcare costs and decreased support for government-funded health insurance. Information emphasizing social attribution of diseases may lead to a reduction in individual-level preventive behaviors (Byrne & Hart, 2009; Cho & Salmon, 2007).

Different types of attributions may serve as crucial factors in moderating narrative strategies and policy advocacy effects. A study investigating how narratives related to obesity impact the public's willingness to support public policies found that different blame attributions in narratives lead to varied policy persuasion effects. Specifically, narratives attributing obesity to individual factors increased support for policy interventions aimed at punishing overweight individuals, while narratives attributing obesity to environmental factors increased support for interventions

designed to protect those with obesity (Thibodeau et al., 2015). Additionally, political ideology and personal experience were identified as important factors influencing individuals' blame attribution.

Previous research has found that low-level construal promote specific, biased individual problem attributions, while high-level abstract construal are conducive to defensive social environment attributions (Zhao et al., 2022). In comparison to narrative stories, statistical evidence provides broader data support, quantifying the scale and trends of issues. They contribute to formulating more objective and comprehensive policies, enabling policymakers to make decisions based on extensive data. Abstract statistical evidence aligns better with the objectivity and comprehensiveness of social attribution; hence, social solutions require robust statistical evidence as support. Based on this, our study assumes:

*H1: When advocating for policy using anecdotal stories, personal attribution will elicit higher willingness to support betel quid sales regulation policy than social attribution.*

*H2: When advocating for policy using statistical evidence, social attribution will elicit higher willingness to support betel quid sales regulation policy than personal attribution.*

#### **2.4 The Mediating Role of Feeling of Pity**

The relationship between narrative and emotion is closely intertwined, and emotion plays a crucial role in comprehending the processing of narratives. Health narratives are skillfully constructed to elicit robust emotional responses and shape the audience's attitudes, aiming to influence behavioral changes. In this context, these customized narratives have the potential to evoke either positive or negative emotions, acting as predictors for subsequent behavioral changes (Green & Brock, 2000). Moreover, aligning narrative type with attribution immerses readers in specific roles

and situations, heightening emotional experiences that, in turn, augment public willingness to support policies. For instance, research on climate change narratives has demonstrated their ability to evoke empathy and foster resonance, thereby contributing to the fortification of democratic values (Mcbeth et al., 2022). The role of emotions in narrative persuasion is significant, with numerous studies establishing positive correlations between emotions and attitudes. Emotions induced by narratives may serve as a mediator in narrative persuasion. In typical cancer policy advocacy scenarios, sympathy emerges as a crucial antecedent to garner public policy support. Therefore, this study posits:

*H3: The feeling of pity serves as a mediating factor between advocacy narratives and the willingness to support policies ;*

### **2.5 The Moderating Role of Regional Identity**

However, individuals may develop beliefs about the cause of cancer, and these causal attributions may impact psychosocial adjustment (Ferrucci et al., 2011). Numerous studies indicate the presence of biases in causal attributions, and research findings on causal attributions extend to the relationships between ingroup and outgroup members. Generally, ingroup members tend to attribute positive acts more internally and negative acts less internally compared to outgroup members. Furthermore, previous research has found that people tend to explain negative outcomes of their own group based on external factors (e.g., misfortune) and attribute failures of outgroup members to internal factors (e.g., laziness) (Harell, Soroka, & Iyengar, 2017).

Conservatives are more inclined to assign health responsibility to individuals rather than society, while liberals generally believe that the government is more capable and representative of society, thus having confidence in the government's ability to improve social health (Lundell et al., 2013; Temmann et al., 2021). The

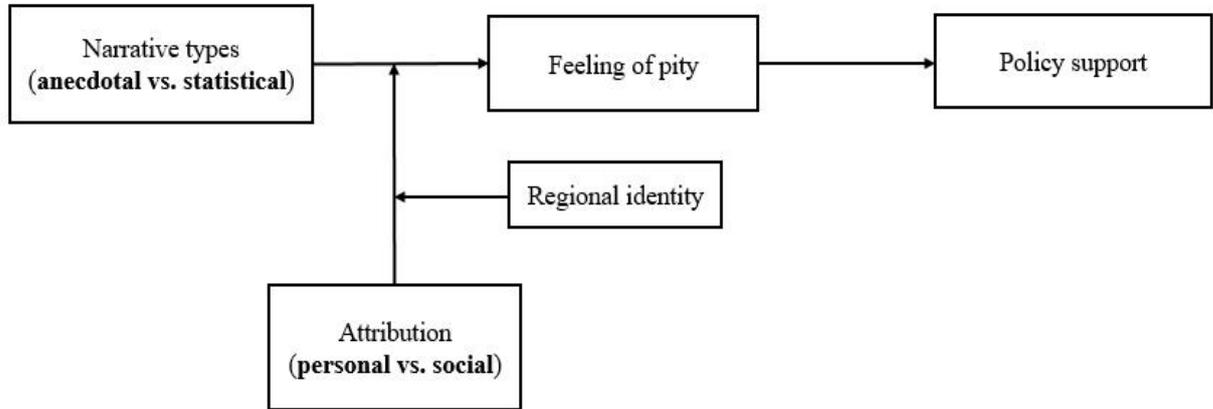
mainstream ideology in China advocates for collective solutions, emphasizing the significant role and function of the state and society in health promotion. Audiences with stronger regional identity are more likely to attribute factors leading to oral cancer to society, hence showing greater acceptance of social solutions and higher willingness to support betel quid regulation policies. We expect that regional identity may moderate the different preferences of the public for individual and social solutions. Our research hypotheses:

*H4: Public with higher regional identity is more likely to endorse policy advocacy with social attribution.*

*H5: Public with lower regional identity is more likely to endorse policy advocacy with personal attribution.*

### **3 Overview of the Study**

This study delves into the intricate dynamics of narrative persuasion in the realm of cancer policy advocacy, specifically exploring the interplay between narrative types, emotional responses, and policy support willingness. The hypothetical model illustrated in Figure 1 outlines the complex interplay of factors influencing public support for stringent betel quid sales regulation policies. The model incorporates the impact of different narrative strategies and cancer attribution. Specifically, we hypothesize that the impact of narrative type on policy support willingness is moderated by causal attribution, with the feeling of pity playing a mediating role in this process. Additionally, regional identity is expected to moderate the influence of causal attribution on policy support willingness.



**Figure 1** Research model

## 4 Methods

### 4.1 Procedure and stimuli

We tested hypotheses and research questions by randomizing a sample of 285 adults (32.6% female) living in Hunan province in China to one of four experimental conditions. The sample size was based on a priori power analysis to detect an effect size of  $f=0.16$  (estimated from previous studies) with a power of 0.80 and  $\alpha=0.05$  (Cohen, 1988). All participants were recruited through the Credamo data platform and were invited to participate in a study on their opinions about health issues. Data were collected on weekends between December 15 and 18, 2024. Adults aged 18 and older ( $M = 27.8$ ,  $SD = 8.97$ ) who were interested in the study were asked to provide informed consent after reading the study procedures. The median household between RMB 6,000 and 10,000.

In the study, participants were randomly allocated to one of four exposure

conditions aimed at investigating the impact of various narrative types in conjunction with different attributions on the intention to support related policies. Specifically, a between-subjects experimental design employing a 2 (anecdotal evidence vs. statistical evidence)  $\times$  2 (personal attribution vs. social attribution) framework was utilized. Following the exposure, participants promptly filled out a questionnaire gauging their responses to the article and their intentions to support the policy on betel nut regulation.

In all conditions, participants were exposed to a social media article describing the causal relationship between chewing betel quid and oral cancer. The four articles were adapted from relevant topics on Weibo. Respondents were randomly assigned to read either (a) an anecdotal story or (b) statistical evidence, matched with different attribution types (personal attribution vs. social attribution). Condition one presented an anecdotal story where the protagonist, due to long-term betel quid chewing, developed oral cancer, attributing the cause to personal unhealthy dietary habits. In condition two, a similar anecdotal story was presented, but the protagonist attributed the cause of oral cancer to social factors (cultural influences, profit motives of betel quid sellers, and insufficient government regulation).

Condition three featured an article using statistical evidence to discuss the relationship between chewing betel quid and oral cancer, attributing the increased incidence of oral cancer to individual unhealthy dietary habits. Condition four's statistical data matched social attribution (cultural influences, profit motives of betel quid sellers, and insufficient government regulation). To ensure comparability of the narrative information regarding betel quid causing oral cancer, we maintained consistent length (approximately 250 words) and causal sequence across all four versions of the story, with only the narrative type (anecdotal story vs. statistical evidence) and attribution (personal attribution vs. social attribution) being altered.

#### **4.2 Measures: Independent variables**

Respondents saw the cancer news of the four manipulated social media articles in online questionnaire and were asked to indicate on a 7-point-scale (1= not at all, 7= definitely) the extent to which these articles featured "anecdotal evidence" and "statistical evidence". Subsequently, participants were inquired about their perceptions regarding the degree of responsibility assigned to various entities (arranged randomly). They were prompted to indicate whether these entities bear minimal responsibility (a), moderate responsibility (b), significant responsibility (c), or substantial responsibility (d) in addressing the issue of oral cancer. Items were derived from the same sources as the cause items (Niederdeppe et al., 2011).

#### **4.3 Mediation Variable**

To measure feeling of pity, we used established scales reliably implemented across several studies in recent literature (Corrigan et al., 2003; Zhang & Wen, 2021). Examples of items included "I would feel pity for oral cancer patients"; "How much sympathy would you feel for oral cancer patients?"; "How much concern would you feel for oral cancer patients?" (1 = not at all, 7 = very much; Cronbach's  $\alpha = 0.83$ ).

#### **4.4 Moderator: Regional identity**

Regional identity was measured using the following four items: If you could improve your job or living conditions, how willing or unwilling would you be to move to another province? (1 = "Very willing"; 5 = "Very unwilling"); I would prefer to be a member of my province rather than any other province. (1 = "Strongly agree"; 5 = "Strongly disagree") (R); If people in other provinces were more like the people in our province, the country would be better off. (1 = "Strongly agree"; 5 = "Strongly disagree") (R); Overall, my province is better than most other provinces. (1 = "Strongly agree"; 5 = "Strongly disagree") (R) (Cronbach's  $\alpha = 0.78$ ).

#### **4.5 Dependent variable**

Policy support intention was measured using a scale adapted from Niederdeppe et al. (2014). The scale included the following questions: "The Chinese government should actively regulate the production and sale of betel quid."; "Government regulation of the production and sale of betel quid has the potential to reduce the incidence of oral cancer."; "Government regulation of the production and sale of betel quid is proposed to address the issue of oral cancer." Participants were asked to respond to these statements, and the reliability of the scale was assessed with a Cronbach's alpha value of 0.82, indicating good internal consistency.

#### 4.6 Control variables

We measured cancer health literacy (i.e., "The normal range for hemoglobin for a male is 13.3–17.2 g/dl. Joe's hemoglobin is 9.7 g/dl. Is Joe within the normal range?"; "A biopsy of a tumor is done to ..."; "If a patient has stage 1 cancer, it means the cancer is ... "; "Sally will get radiation therapy once a day, Monday through Friday. If Sally has therapy for 4 weeks, how many times will she get radiation therapy?") (Dumenci et al., 2014) and the experience of betel quid consumption as covariates.

## 5 Results

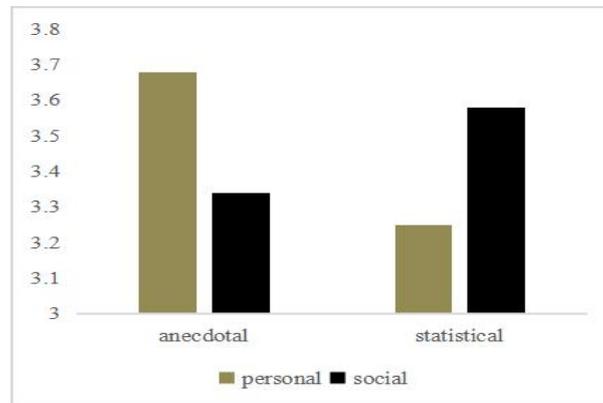
### 5.1 Manipulation Checks

The results of the manipulation check indicate that participants exposed to anecdotal evidence perceived the news to contain more anecdotal evidence ( $M=5.24$ ,  $SD=0.76$ ) than statistical evidence ( $M=3.05$ ,  $SD=1.07$ ,  $|t(285)|= 15.791$ ,  $p<.001$ ). Conversely, participants exposed to statistical evidence reported the news to contain more statistical evidence ( $M=5.72$ ,  $SD=1.27$ ) than anecdotal evidence ( $M=3.26$ ,  $SD=1.32$ ,  $|t(285)|= 12.65$ ,  $p<.001$ ). Additionally, participants who read about personal attribution reported higher levels of personal attribution ( $M=4.65$ ,  $SD=0.67$ ) compared

to those who read about social attribution ( $M=3.37$ ,  $SD=1.18$ ,  $|t(285)|= 11.23$ ,  $p<.001$ ). Participants who read about social attribution reported higher levels of social attribution ( $M=3.84$ ,  $SD=0.98$ ) than those who read about personal attribution ( $M=1.7$ ,  $SD=1.11$ ,  $|t(285)|= 17.34$ ,  $p<.001$ ).

## 5.2 Effects of Narrative Type

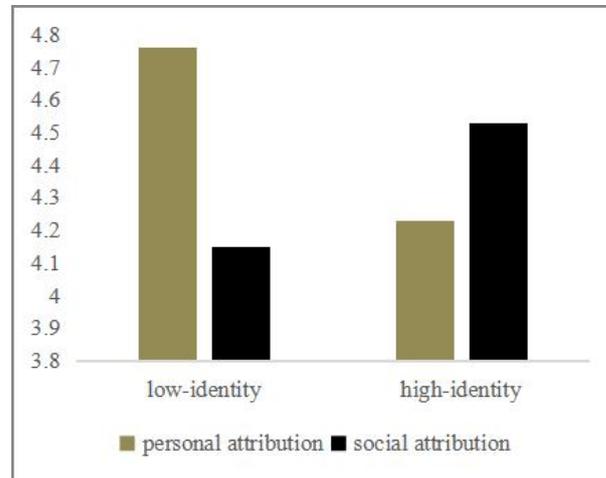
Using SPSS 20, we conducted an ANCOVA for dependent variable with two independent factors (narrative type and attribution) and six covariates (cancer health literacy, betel quid chewing experience, age, gender, income, education). The willingness to support betel quid regulation policy yielded the predicted two-way interaction,  $F(1, 281) = 7.2$ ,  $p = .008$ ,  $\eta^2_p = .025$  (along with no main effect of narrative type,  $F(1, 281) = 0.094$ ,  $p = .81$ ,  $\eta^2_p = .086$ , attribution,  $F(1, 281) = 0.00$ ,  $p = .993$ ,  $\eta^2_p = .000$ ). Simple effects revealed that the interaction unfolded as expected (Fig. 1). First, supporting H1, indicating that when the article adopts anecdotal stories as a narrative type, personal attribution triggers a higher willingness to support policies compared to social attribution ( $M_{\text{anecdotal}} = 3.68$ ,  $SD = 0.13$  vs.  $M_{\text{statistical}} = 3.19$ ,  $SD = 0.12$ ,  $F(1, 274) = 4.21$ ,  $p = .041$ ,  $\eta^2_p = .106$ ). Secondly, H2 was supported, as as connecting oral cancer with social attribution results in statistical information generating a higher willingness to support policies compared to anecdotal stories ( $M_{\text{anecdotal}} = 3.33$ ,  $SD = 0.12$  vs.  $M_{\text{statistical}} = 3.65$ ,  $SD = 0.12$ ,  $F(1, 274) = 6.90$ ,  $p = .009$ ,  $\eta^2_p = .025$ ).



**Figure 2** The effects of narrative type and attribution type on policy support intention.

### 5.3 The Moderating Role of Regional Identity

We then conducted an ANCOVA for dependent variable with cause attribution, regional identity and six covariates (cancer health literacy, betel quid chewing experience, age, gender, income, and education). The willingness to support betel quid regulation policy yielded the predicted two-way interaction,  $F(1, 281) = 3.1, p = .018, \eta^2_p = .025$  (along with no main effect of narrative type,  $F(1, 281) = 0.094, p = .81, \eta^2_p = .066$ , attribution,  $F(1, 281) = 0.44, p = .629, \eta^2_p = .304$ ). Simple effects revealed that the interaction unfolded as expected (Fig. 3). First, supporting H4, individuals with low regional identity are more inclined to endorse personal attribution ( $M_{per} = 4.76, SD = 0.21$  vs.  $M_{soc} = 4.15, SD = 0.35$ ). Secondly, H5 was supported, as when individuals have high regional identity, societal attribution triggers more support for betel quid sales regulation policies than personal attribution ( $M_{per} = 4.23, SD = 0.39$  vs.  $M_{soc} = 4.53, SD = 0.27$ ).



**Figure 3** Effects of Attribution Type and Regional Identity on Policy Support Intention.

#### 5.4 Mechanism

We then ran a moderated mediation model following Hayes (2018, model 7). We predicted that feeling of pity drove the effect of narrative evidence on the policy support intention. In separate regressions predicting the mechanism variable from narrative type, attribution, and their interaction, we found that the two-way interaction was significant on feelings of pity ( $b = 0.71$ ,  $SE = 0.298$ ,  $|t(285)| = 2.38$ ,  $p = .017$ ,  $d = 0.282$ ).

Next, in a single regression predicting participants' policy support intention with the mediator, the experimental variables, and all the interactions, feeling of pity ( $b = 0.13$ ,  $SE = 0.049$ ,  $|t(280)| = 2.27$ ,  $p < .024$ ,  $d = 0.27$ ) was significant predictors. Moreover, using a bootstrapping procedure with 5,000 samples, we found that when oral cancer was attributed to social causes, narrative type influenced policy support via the feeling of pity (95% CI: 0.011 to 0.187), thereby confirming Hypothesis 3. No other indirect effect emerged. Thus, feeling of pity mediated the effect of narrative type on the policy support intention, when oral cancer was attributed to social causes.

## 6 Discussion

The present study aimed to investigate the complex interplay of narrative strategies and cancer attribution in shaping public support for stringent betel quid sales regulation policies. The findings contribute to our understanding of the role narratives play in policy advocacy and the nuanced impact of attribution types on public attitudes. The results supported Hypothesis 1 and Hypothesis 2, revealing that the narrative type and attribution interact to influence public willingness to support betel quid sales regulation policies. When anecdotes were used, personal attribution triggered higher policy support than social attribution. Conversely, when statistical evidence was presented, social attribution led to greater support than personal attribution. These findings underscore the importance of aligning narrative strategies with specific attribution types to maximize policy advocacy effectiveness.

This study, grounded in the policy narrative framework and attribution theory, explores in-depth how narrative types influence the public's willingness to support evidence-based health policies by examining their cognitive evaluations of policy advocacy information on social media platforms related to betel quid regulation in the context of oral cancer. The results indicate that the impact of narrative types on policy support attitudes is influenced by the attribution type in policy narratives. Specifically, consistent with previous research emphasizing the negative effects of anecdotal stories (Hornikx, 2005; Hinnant et al., 2016), the experimental results suggest that when advocacy information uses social attribution, anecdotal stories, compared to statistical evidence, lead to a decrease in the public's willingness to support health policies. This may be because anecdotal evidence is often personalized and emotionally oriented, and when combined with social attribution, it may make the news protagonist appear less reliable or misleading.

Research across diverse disciplines offers varied perspectives on how different types of evidence persuade individuals to recognize causal links within narratives. This body of work, integrating a myriad of methodologies, sometimes leads to divergent conclusions (Flemming et al., 2017; Hoeken & Hustinx, 2009; Peng & Huang, 2020; Rodriguez et al., 2016; Vlasceanu & Coman, 2022). Taking cancer news—a prime medium for health risk communication—as a focal point, this study demonstrates the narrative type depicting the causal relationship between betel quid chewing and oral cancer interacts with cause attribution (social attribution vs. personal attribution) to influence individuals' feeling of pity to the oral cancer patient and intention to support betel quid regulation policies. This finding emphasizes the emotional component of narrative persuasion, highlighting the importance of eliciting specific emotions, such as pity, to enhance support for health policies.

Our research provides a comprehensive understanding of the differential persuasive effects of various evidence types. Prior studies have shown that anecdotal stories more readily evoke emotions such as surprise, fear, and sadness. Such emotional triggers can amplify individual risk perceptions, making the narrative more persuasive (Peng & Huang, 2020). Anecdotal stories also tend to promote intuitive processing, diminishing the audience's scientific reasoning capabilities. These mental shortcuts, although effective in the short-term, might diminish the long-term persuasive impact.

This study contributes to the current literature in several ways. First, it confirms the distinctive effects of anecdotal story and statistical evidence on attitudes towards betel quid regulation policies by adopting the attribution theory to examine the effects of cause attribution on the public perception of oral cancer. Second, our findings offer some valuable insights for public health campaigners. Policymakers and health communicators should carefully tailor narratives to align with specific attribution types. Anecdotal stories may be more effective in promoting policies when

emphasizing personal responsibility, while statistical evidence may be better suited for supporting societal attribution. Furthermore, understanding regional identity is crucial in designing targeted health communication campaigns. Recognizing the influence of regional identity on attribution preferences allows for more nuanced and effective policy advocacy strategies. Finally, the study highlights the importance of emotional engagement, particularly the elicitation of pity, in narrative persuasion. Policymakers should aim to craft narratives that evoke emotions conducive to policy support, fostering a deeper connection with the audience.

## **7 Limitations and Future Research**

Despite the valuable insights gained from this study, several limitations warrant consideration. Firstly, the research focused on a specific region (Hunan province), limiting the generalizability of findings to other cultural contexts. Future research should explore diverse regions to assess the external validity of the observed effects. Additionally, the study employed a simulated online environment, potentially lacking the real-world complexities of interpersonal interactions. Conducting similar experiments in more ecologically valid settings could enhance the external validity of the findings.

Furthermore, the study predominantly examined the immediate impact of narrative type and attribution on policy support intention. Longitudinal studies tracking participants over time could provide a more comprehensive understanding of the sustained effects of narrative persuasion on policy attitudes. Additionally, investigating the role of individual differences, such as political ideology and prior health experiences, could contribute to a more nuanced understanding of how diverse audiences respond to health policy narratives.

The study primarily focused on a specific health issue (oral cancer related to

betel quid consumption), and future research should explore the applicability of the findings to different health contexts. Comparative studies across various health issues can elucidate whether the observed effects are specific to certain topics or generalizable to broader health policy communication.

In conclusion, while this study advances our understanding of narrative persuasion in health policy communication, addressing these limitations in future research can contribute to a more robust and comprehensive knowledge base in this evolving field.

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## Appendix

### **Anecdotal evidence \* Personal Attribution**

**[Background]** When it comes to oral diseases, many people may first think of conditions like oral ulcers, gingivitis, and tooth decay. However, in addition to these, oral cancer is also a common type of head and neck tumor.

**[Evidence]** My name is Su Xiaofeng, and I live in an area where betel nut chewing is a common practice. Recently, I just completed the second cycle of chemotherapy at the Cancer Hospital in Hunan Province. Initially, I only felt that chewing betel nuts could cause oral ulcers but didn't pay much attention. Unexpectedly, the damage to the oral cavity did not heal over time, and the doctor said it was oral cancer caused by fibrotic changes beneath the oral mucosa.

**[Policy Advocacy]** In my opinion, oral cancer is mainly caused by personal reasons. Over these years, my unhealthy diet and lifestyle habits have been significant factors triggering oral cancer.

### **Anecdotal evidence \* Social Attribution**

**[Background]** When it comes to oral diseases, many people may first think of conditions like oral ulcers, gingivitis, and tooth decay. However, in addition to these, oral cancer is also a common type of head and neck tumor.

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**[Policy Advocacy]** In my view, oral cancer is mainly caused by social reasons. The prevalence of betel nut culture in our local area, inadequate regulation by relevant authorities, and widespread advertising of betel nut products in society have largely contributed to the extensive consumption of betel nuts and a higher incidence of oral cancer.

### **Statistical Evidence \* Personal Attribution**

**[Background]** When it comes to oral diseases, many people may first think of conditions like oral ulcers, gingivitis, and tooth decay. However, in addition to these, oral cancer is also a common type of head and neck tumor.

**[Evidence]** Globally, 58% of new cases occur in regions of South and Southeast Asia where betel nut chewing is prevalent. Clinical data studies indicate that over 90% of oral cancers are directly related to betel nut consumption. Through the analysis of 152 chewers and 137 non-chewers, researchers found that 84.4% of chewers had oral mucosal lesions. The probability of oral mucosal fibrosis worsening into oral cancer for those who have been chewing betel nuts for 15-20 years or more is nearly 65 times that of those who have been chewing for 1-5 years.

**[Policy Advocacy]** Oral cancer is primarily caused by personal reasons. Unhealthy dietary and lifestyle habits are crucial factors in triggering oral cancer.

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**【Editor】** Wang Xinyi

# Mourning on social media in China: A case study of the Bilibili memorial account @MochaOfficial

© Qian Liu, Quanbang Zhang, Yong Min

**Abstract** Social media platforms have facilitated the integration of mourning into the digital realm, enabling bereaved individuals to connect with the deceased and incorporating social elements into conventional mourning practices. This paper utilizes computational communication techniques to analyze the memorial account *@MochaOfficial* on the Bilibili platform as a case study. The system examines the underlying topics and emotional expressions found in the comments associated with its video content. The study reveals that users spontaneously establish a community of mourners by engaging in interactive comments in the absence of platform features. The regular involvement of individuals and their restrained displays of grief, in line with the community's public nature, subtly reveal a private aspect within the public online platform. Furthermore, the significance of the deceased person's identity is pivotal in the growth of the grieving community.

**Key Words** Social Media; Online Mourning; Computational Communication

## 1 Introduction

The phenomenon of mourning in the online realm has garnered significant interest, surpassing conventional mourning practices and taking on innovative forms through digital media. Social media platforms provide a variety of ways for individuals to show their sorrow and mourning after the passing of loved ones or notable figures, ranging from online memorial boards to virtual remembrance services. It emphasizes the blending of personal and group emotional encounters and the changing connection between the digital and physical realms. Web sites were used as a means of early online mourning, allowing people to indirectly express their personal emotions, preserve memories of the deceased, and provide support to others (Beaunoyer & Guitton, 2021).

Due to the emergence of social media, online places for mourning have evolved from simple web pages to social platforms, resulting in increased involvement and social connectivity. Facebook was one of the pioneering social platforms to include online grief into its feature design. Since 2009, regulations have been implemented to govern the access and commemoration of digital legacies and personal profiles of deceased users (Brubaker et al., 2014). Additionally, RIP memorial pages have been created to offer technical assistance to friends and other users of the deceased, allowing them to express condolences, share stories, celebrate birthdays, and reminisce. Only Bilibili and Weibo in China have established policies regarding digital legacy and account data preservation, but they have not yet implemented the necessary technical elements. Online grieving culture in China predominantly relies on the formation of mourning communities through the utilization of groups, topics, or specialized account comment areas on social platforms. This is achieved by posting and engaging in online commenting. As an illustration, the "Douban Cemetery" group

was founded on Douban in 2012 with the purpose of honoring people who have passed away.

Amidst the contrasting progress in social platform features between China and other nations, studies on digital grieving also reveal discrepancies. Globally, there has been significant research conducted on digital mourning culture, specifically examining grieving behaviors exhibited on social media platforms and the cultural causes that drive these behaviors. Conversely, China has a deficiency of comprehensive research on the culture of mourning online through social media platforms. We are intrigued by the limited number of studies on grieving culture on Chinese social media platforms, particularly in the absence of dedicated digital legacy management features on platforms like Bilibili and Weibo. This study chooses *@MoChaOfficial*, a commemorative account formed on the Chinese social media platform Bilibili, as the subject of the case study. This research investigates the characteristics and development of digital mourning content and emotions on Chinese social media platforms, by analyzing mourning texts in the video comment section through temporal data mining, textual content analysis, and sentiment analysis. The objective is to gain insights into the manifestation of China's digital mourning culture on social media.

## 2 Literature Review

### 2.1 The role of social media in online grieving

Prior research has primarily focused on investigating how online grieving adopts and challenges the social roles and norms associated with conventional mourning. This is accomplished by examining the profiles of dead users on Facebook (Church, 2013), Facebook memorial pages (Courbet & Fourquet-Courbet, 2014), and grief communities on various platforms (Myles & Millerand, 2016). Social platforms

enable users to express and share grief, provide and receive emotional support, and develop grieving groups to establish a sense of group identity. Alternatively, as suggested in Moore's Social Media Mourning model, the act of grieving on the internet involves engaging with acquaintances, loved ones, community members, or even those unknown to the mourner, as well as the departed (Moore et al., 2019). Individuals are provided with novel prospects to manage their emotions (Marwick & Ellison, 2012) and sustain connections with the deceased (Irwin, 2015).

Furthermore, social media platforms offer a digital environment and technical assistance for grieving online, which directly impacts society's perception of death and loss, and modifies the range of societal expectations related to mourning. Studies suggest that grieving practices on social media tend to align with and adopt some aspects of conventional standards, while also evolving in response to new technological advancements and ongoing user interactions (Wagner, 2018). The most controversial cultural norm shift centers around the clash between public and private manifestations. The act of publicly expressing emotions and vulnerability is seen as a new form of emotional expression that is brought about by online mourning. This shifts the experience of grief from being private to being public, and it also blurs the traditional boundaries between public and private expressions (Arthur, 2009).

## **2.2 Mourning on social media within the Chinese cultural context**

In China, the culture of mourning on social media is currently in its early stage of development, both in terms of media functionality and academic research. However, this does not mean that online mourning practices are nonexistent. Despite the absence of specific features, users ingeniously articulate their sorrow, transcending technological constraints. Presently, in China, the predominant method of online mourning involves leaving comments on the textual and visual information posted on the social media accounts of the deceased. In contrast to the increasing prevalence of

online mourning rituals, the field of domestic academics has seldom prioritized the study of online mourning. Previous studies have investigated the influence of digital media on online mourning practices (Wu et al., 2022), and Xu and Dong (2019) has explored the social norms of online mourning from the standpoint of emotional sociology. However, none of these studies have specifically identified the cultural traits of online mourning in Chinese society using localized experiences.

International research encompasses the examination of both celebrities and disaster victims (Courbet & Fourquet-Courbet, 2014; Vicary & Fraley, 2010). However, the majority of these studies primarily concentrate on regular users grieving for their deceased friends and family. Conversely, the limited number of empirical studies carried out in China predominantly focus on examining online mourning communities that revolve around prominent individuals. Specifically, these studies have concentrated on the Weibo community associated with *Li Wenliang*, a prominent individual during the COVID-19 pandemic. Zhou and Zhong (2021) conducted an investigation into the development of a grieving community on Li Wenliang's Weibo account following his passing, while Xi and Luo (2022) examined how the general public constructs a shared recollection of Li Wenliang on social media. Nevertheless, these studies fail to directly tackle the central controversy in Chinese cultural and social context regarding online mourning research, which pertains to the intricate connection between publicity and privacy resulting from heightened visibility on social media. Additionally, they overlook the online mourning practices of regular users.

Therefore, this study selected the memorial account *@MoChaOfficial* on Bilibili as the subject of research in order to investigate the development and distinguishing features of online mourning culture within the Chinese context. The research questions that it specifically raises are as follows:

Research question 1: How does an online mourning community form on social

media?

Research question 2: What are the textual motifs and emotional traits exhibited by ordinary users when mourning online?

Research question 3: Why do people mourn online?

### 3 Method

This study specifically examines the memorial account *@MoChaOfficial* on the Chinese video media platform Bilibili. The individual, who was initially a rather unpopular video blogger, gained considerable postmortem prominence as a substantial number of users on the site left words of condolences on their videos. This led to the spontaneous formation of a mourning community in the comment part of the videos. Thus, the study gathers its data from the comment sections of all their movies in order to analyze the attributes of emotional expression.

#### 3.1 The case of *@MoChaOfficial*

The demise of Bilibili's content creator *@MoChaOfficial* gained widespread attention in the early hours of January 21, 2021. On January 22, Bilibili formally authenticated the information with local authorities and confirmed the demise of *@MoChaOfficial* on January 10 as a result of illness. Consequently, they designated the account as a "Memorial Account" and permanently archived its video content and activities. The demise of *@MoChaOfficial* garnered significant attention on the internet, largely because of the distressing portrayal of him and his companion, another Bilibili user *@YubiEiriichi\_Official* on the Bilibili platform. This image portrays an individual who has experienced unfortunate circumstances, facing both financial hardship and being forsaken by their family. However, despite these challenges, they continue to exhibit resilience and maintain an optimistic outlook on

life. *@MoChaOfficial* commenced posting and engaging in live streaming activities on Bilibili in February 2020, amassing a mere 100 followers by the conclusion of July 2020. His profile documented his enduring chronic illness, characterized by persistent pain and multiple surgeries. Users constructed a portrayal of *@MoChaOfficial* as a destitute and unlucky individual who persisted in producing content on Bilibili. This depiction evoked widespread sympathy and outrage. *@MoChaOfficial* gained rapid popularity and attracted significant attention and messages from internet users due to the unfortunate circumstances surrounding an average individual. This resulted in the emergence of memorial account functionalities on social media platforms, representing a significant advancement in China's social media landscape with regards to the handling of digital legacies. Therefore, we selected *@MoChaOfficial* as the subject of this study.

### 3.2 Data Collection

The study employed Python to retrieve comments from all 28 videos on the *@MoChaOfficial* account page. Data collection concluded on January 4, 2022, at 21:00, encompassing data as early as March 17, 2020, at 15:20. Following the purification process, a grand total of 139,983 legitimate entries were acquired. Certain omitted comments may not be encompassed within the dataset.

### 3.3 Data Analysis

In this study, we employ a comprehensive approach encompassing time-series analysis, sentiment analysis, and thematic analysis to meticulously dissect the dataset and extract meaningful insights.

#### 3.3.1 Time-series Analysis

Using a time-series analysis, all videos post by *@MoChaOfficial* account and all the comments of each were analyzed to identify the behavior pattern of users' digital mourning.

### 3.3.2 Sentiment Analysis

Sentiment analysis is a technique used in text analysis to ascertain the emotional orientation of subjective text. Typically, there are three methods employed: machine learning using manual annotation, sentiment dictionary matching, and deep learning.

The Snow NLP tool utilized in this research utilizes a sentiment lexicon to identify emotional inclinations in the data and then matches them with the lexicon to categorize the mood of the data. Sentiment dictionaries are more convenient and prevalent in usage when compared to the other two ways.

### 3.3.3 Thematic Analysis

The study utilizes Jieba, a Chinese word segmentation program, to process the data by eliminating stopwords and cleansing the dataset, as well as calculating word frequencies, ensuring that the data is ready for analysis. Then, the Latent Dirichlet Allocation (LDA) algorithm is utilized to detect latent themes in the comments, while the Python library pyLDAvis is implemented for interactive visualization.

The LDA topic generation model, an unsupervised machine learning technique, can detect patterns and topics in extensive collections of documents called corpora. The topic probability distribution model developed by Blei et al. is derived from the probabilistic latent semantic indexing. The initial results of LDA topic categorization are frequently difficult to interpret manually, creating difficulties in the process of theme induction. LDAvis, a tool for visualizing Latent Dirichlet Allocation (LDA), includes a relevance parameter  $\lambda$  ( $0 \leq \lambda < 1$ ) to specifically tackle this problem. The formula is as stated:

$$\text{relevance}(\text{term } w \mid \text{topic } t) = \lambda * p(w \mid t) + (1 - \lambda) * p(w \mid t)/p(w)$$

This formula calculates the relative weight of the probability of term  $w$  within topic  $k$  in relation to its lift, which is quantified on a logarithmic scale. When  $\lambda$  is set to 1, words are arranged in descending order of their probability inside a certain topic, taking into account word frequency. On the other hand, when  $\lambda$  is set to 0, terms are

arranged purely based on their distinctive characteristic within a topic.

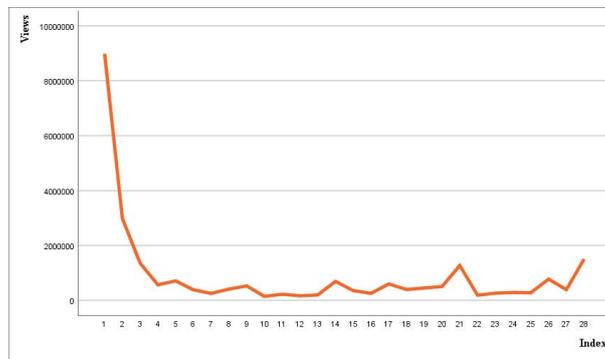
## 4 Result

### 4.1 Descriptive results

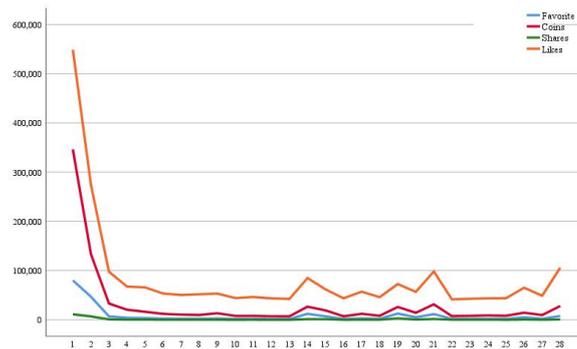
As of January 4, 2022, at 21:00, MoCha has shared a total of 28 videos, accumulating 202,500 followers. These videos have received a total of 25,076,794 views, 2,351,592 likes, 236,308 favorites, 854,672 coins (Bilibili's tipping system for creators), 29,717 shares, 358,499 bullet comments, and 139,983 comments. Based on reports from Bilibili users and MoCha's personal updates, his follower count did not exceed 300 prior to January 19, 2021, which is when the death notice initially surfaced online. Prior to this date, the cumulative number of comments across the 28 videos amounted to merely 58 (constituting a minuscule 0.0004% of the overall count), with the most recent comment being posted on July 3, 2020. These findings suggest that MoCha's videos garnered minimal attention during the four months leading up to the "MoCha incident."

The 28 videos uploaded by MoCha garnered exceptional interest following his death, a level of attention that he could not have foreseen while he was alive. Nevertheless, the allocation of this attention was not uniform across all videos. The mean view count for these videos was 895,599.79, with an average of 4,373.96 comments per video. The metrics for views, response volume (comments and bullet comments), and three consecutive actions (favorites, coin donations, shares), and likes for all videos exhibited a nearly identical pattern based on their release dates (with newer videos having lower sequence numbers). The video titled *"My World War I Memories,"* released on October 17, 2020, received the highest level of attention. It accumulated a total of 8,986,609 views, accounting for 35.8% of the total, and received 66,891 comments, representing 47.78% of the total. In addition, two other

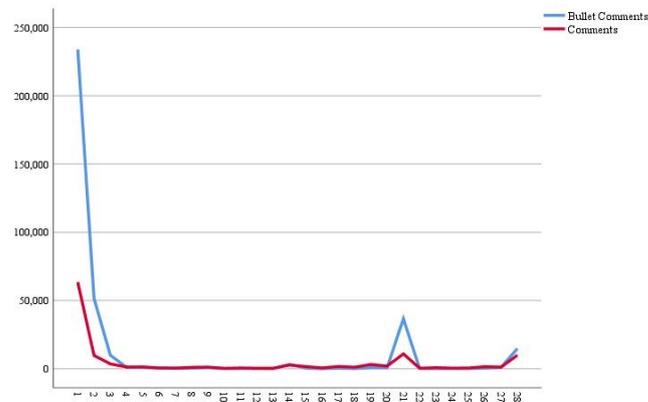
highest values were observed: the video titled "[Birthday Live] Happy to Receive Gifts During Birthday Night Live" released on April 8, 2020 (1,268,238 views, accounting for 5.1% of the total; 10,858 comments, accounting for 7.76% of the total), and the first video of the account titled "Far Cry Primal: End of Live Stream" (1,502,081 views, accounting for 5.99% of the total; 10,660 comments, accounting for 7.62% of the total) (refer to figure 1, 2, 3).



**Figure 1** Trends in the number of views per video



**Figure 2** Trends in the number of favorites, coins, shares and likes per video



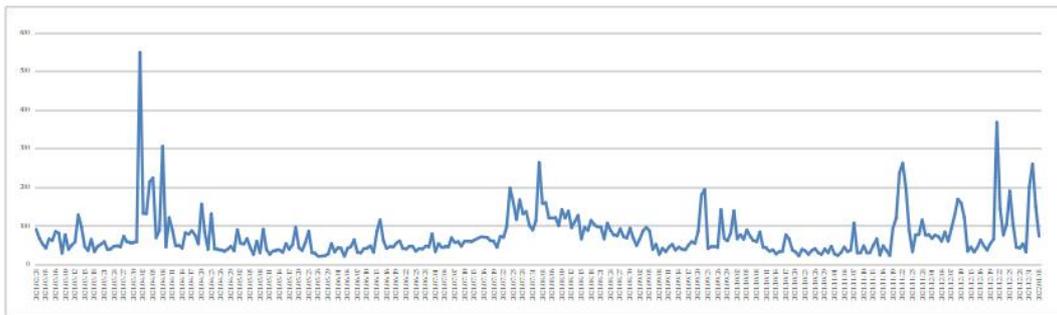
**Figure 3** Trends in the number of bullet comments and comments per video

#### 4.2 Results of Time-Series Analysis

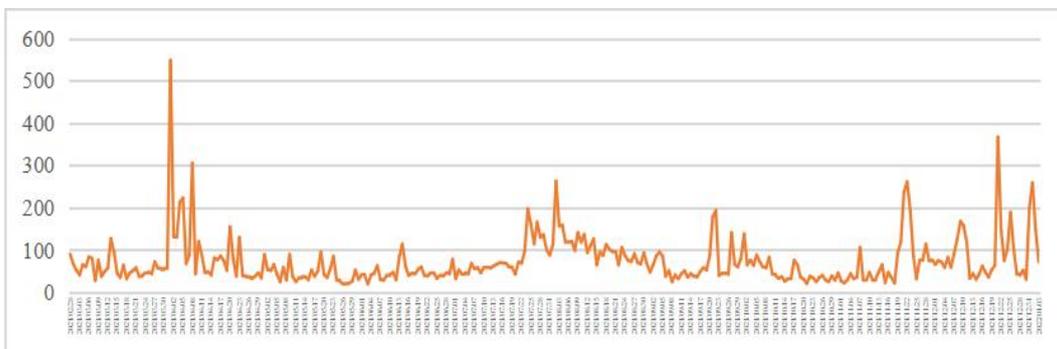
Over the course of almost a year following Mocha's death, his video works received more than 80,000 users who left a total of over 130,000 comments. On average, this amounts to nearly 400 comments per day. However, analyzing the chronological distribution of these comments shows that the overwhelming majority were posted within a week of the "Mocha Incident" being revealed. The kurtosis coefficient of the overall distribution is 161.459. Between January 21st and January 27th, 2021, there were a total of 101,948 comments, which made up approximately 72.83% of the overall amount. The zenith transpired on January 22nd, with a staggering 40,234 comments, signifying a substantial fraction of the overall count. The average daily comment count over the course of these seven days was 14,564, which significantly surpassed the average of 110 comments per day recorded between January 28, 2021, and January 4, 2022.

Upon excluding the data from these seven days, it is evident that the comment volume gradually reached a stable state after the cooling-off period following the sensational event. As the event's popularity declined, comments gradually diminished (refer to figure 4). After the first 30 days, it becomes evident that the Mocha mourning

community has entered a phase of normalized growth, marked by a consistent daily average of 72 comments (refer to figure 5). The sole pinnacle observed within this timeframe transpired on Mocha's anniversary, specifically on April 1, 2021, with the comment count surging to 548. The bivariate correlation analysis between dates and comment volumes resulted in a Pearson coefficient of 0.078 and a significance level of 0.17, indicating that there is no significant correlation. As a result, the group of people who regularly comment on Mocha's videos has reached a consistent and stable state.

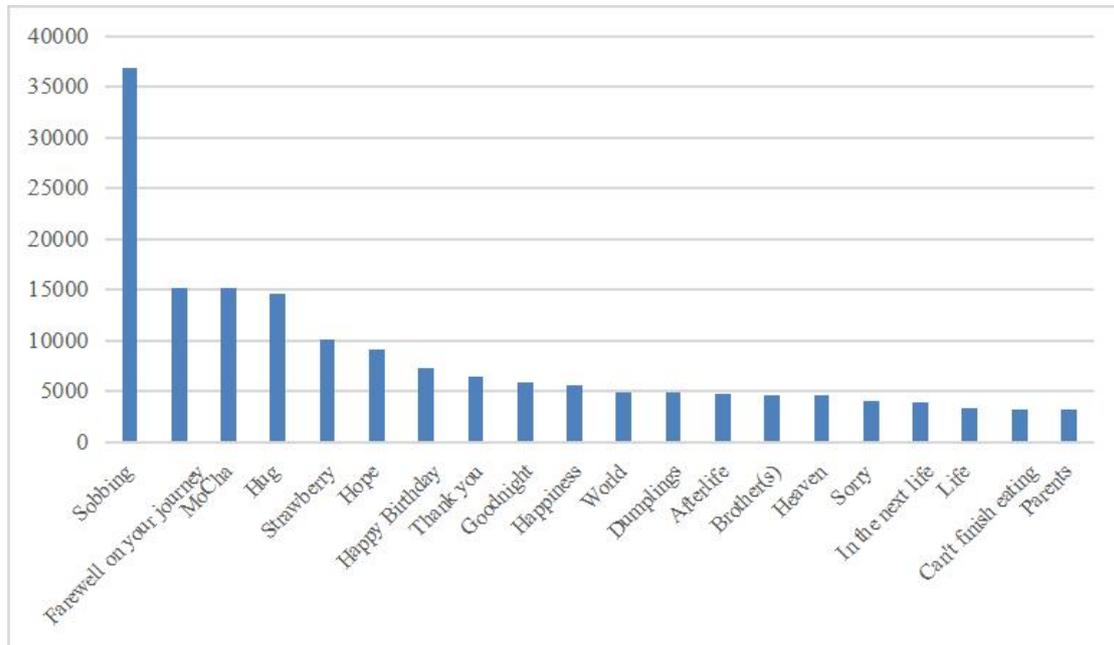


**Figure 4** Trends in the number of daily comments after 7 days



**Figure 5** Trends in the number of daily comments after 30 days

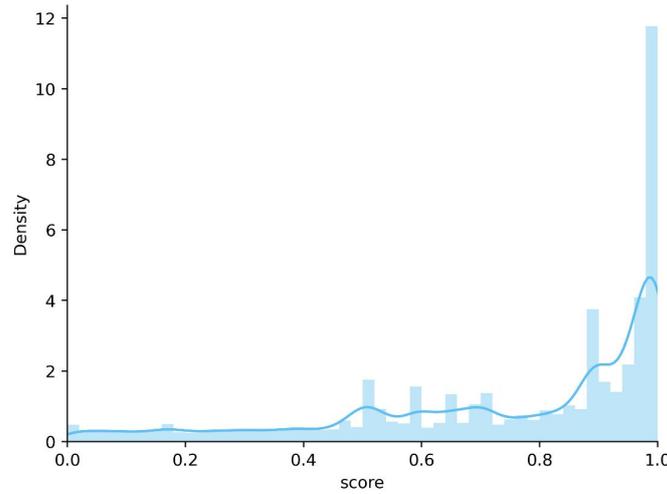




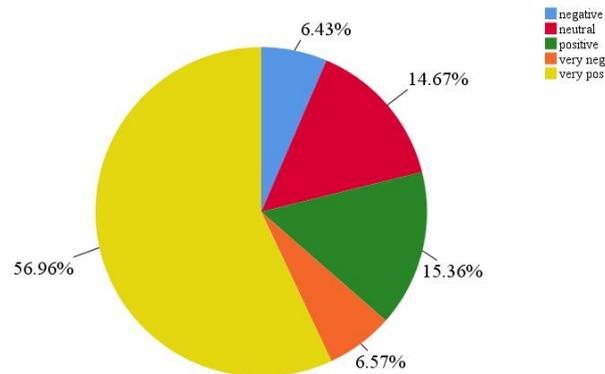
**Figure 7** Top20 most frequent keywords

The SnowNLP software package utilizes an emotion lexicon to assign sentiment tags to textual data. The sentiment scores generated by this package range from 0 to 1. A sentiment score approaching 1 signifies a predominantly positive sentiment, whereas a score approaching 0 signifies a predominantly negative sentiment. Following an extensive examination of the sentiment scores, four emotional thresholds were established: 0.2, 0.4, 0.6, and 0.8. These thresholds categorize the intervals as very negative, negative, neutral, positive, and very positive, respectively. The mean sentiment score of the entire comment dataset was determined to be 0.7491 (refer to figure 8). The analysis revealed a predominantly positive sentiment in the comments section of Mocha's videos. Comments with a score above 0.8, classified as highly positive, represented up to 56.96% (refer to figure 9). This suggests that the atmosphere within the Mocha mourning community is characterized by a positive and

uplifting tone, allowing for the expression of sorrow without descending into despair. This breaks away from the conventional prevalence of sadness typically observed in mourning communities.



**Figure 8** Results of sentiment analysis of comments



**Figure 9** Emotional Classification

#### 4.4 Results of thematic analysis

During the process of LDA topic modeling analysis, LDAvis utilized the parameter  $\lambda$  to tackle the issue in traditional LDA where humans struggle to infer topics based on the relationship between terms and topics. Through a meticulous examination and multiple experiments, it was found that the ideal number of clusters is three, as this arrangement resulted in the highest Jensen-Shannon divergence among topics. An analysis was conducted to examine high-frequency and characteristic words across various topics by considering four different scenarios with  $\lambda$  values set at 0, 0.4, 0.6, and 1. The topics were ultimately classified into three categories: 1) Good Wishes, which accounted for 46.9% of the content; 2) Say to the Air, which made up 26.7%; and 3) Emotional Release, which comprised 26.4% (refer to figure 10, 11, 12; table 1). The prevalence of the Positive Wishes theme also mirrored the findings of the sentiment analysis.

**Table 1** Thematic Summary of the Text

Topic	Description	Most Relevant Terms	Proportion
Good Wishes	Expressing condolences and wishes for the deceased, with a serene mood.	Farewell on your journey, Strawberry, Dumplings, Afterlife, Hope, Brother(s), Heaven	46.90%
Say to the Air	Strong conversational qualities, engaging in a one-way dialogue with the deceased.	Hug, Happy Birthday, Happy New Year, Rest in Peace, Arrived late, Sorry	26.70%
Emotional Release	Expressing sorrow for the deceased, as well as gratitude to other commentators who left wishes, with intense emotions.	Crying loudly, Break down emotionally, Thank you, Come back, Fans, Crying, Mourning, Cha Cha	26.40%

## 5 Discussion

### 5.1 Becoming a part of the mourning community

Out of all the users who participated in commenting, 55.17% of them posted two or more comments. Out of the total number of users, 729 individuals, which accounts for 10.9% of the total, made more than ten comments. Additionally, six users went beyond 100 comments, with the highest number of comments made by a single user reaching an impressive 781.

The comments were classified according to their hierarchical connection to the original video. The video received direct responses, which were categorized as level 1 comments. Replies to these comments were considered level 2, and any subsequent nested comments were classified as level 3. The purpose of this categorization was to assess the degree of engagement among individuals grieving. The findings indicated that 68.6% of the comments were classified as level 1, 23.2% as level 2, and 8.2% as level 3. This suggests a significant degree of engagement within Mocha's video comment section. (refer to figure 13)

An analysis was conducted on the commenting patterns of the three most frequent commenters, spanning from January 26, 2021, to January 4, 2022. The longest duration of activity for any of them was limited to 40 days with comments, however, the gaps between comments were relatively brief, usually resulting in messages being posted every month, suggesting a sustained level of involvement. Their commenting behavior mirrored that of individuals paying a visit to a grave, intermittently coming back to the community to convey their grief for Mocha. Additional examination of the most prolific commenter (referred to as A henceforth) unveiled their assimilation into Mocha's grieving community through two distinct stages: 1) Comprehension and Inclusion (refer to table 2), 2) Protecting and

Promoting (refer to table 3). At first, A's comments were primarily inquisitive and sorrowful, as they offered condolences to an unknown person and gradually acquired information about the deceased. This process likely resulted in an emotional connection with Mocha's narrative or a more profound comprehension of Mocha's character. A developed a unidirectional emotional bond and communication with Mocha by engaging with the digital heritage and interacting with other members of the community. This facilitated A's smooth integration into the grieving community and marked the beginning of their second phase of involvement. Aside from making regular visits to gravesites to offer condolences, A also began recounting the tale of Mocha to individuals passing by and newcomers, with the aim of attracting more participants to this online mourning practice. This would serve to solidify a sense of belonging and establish their own standing within the community.

**Table 2** Representative Comments in the First Phase

Date	Content
2021/1/26	Rationally speaking, I have a question. This Resident Evil game contains gory scenes, which are generally not allowed on most platforms unless they are censored.
2021/1/28	However, thinking about it more rationally, how are the electricity and internet bills for MoCha's game live streaming paid for, considering even having meals is a problem?
2021/1/28	On which platform did MoCha previously live stream games?
2021/1/29	Why say "seeing blood on your birthday is unlucky"? Could it be that the streamer knew they were going to meet their demise at that time?
2021/1/30	A popularity of 3700 is also useless. The key issue is that very few people are watching.
2021/2/7	Unresolved regrets

2021/2/11	Definitely, the edited video is only a few minutes long, but the conceptualization and control of frame rates are very time-consuming. MoCha, he... alas, it's heartbreaking, I won't say more.
2021/2/18	Why is it that someone who's too sore to open their mouth to eat can still open their mouth to talk?

**Table 3** Representative Comments in the second Phase

Date	Content
2021/4/1	The first April without MoCha has arrived. I made a video to commemorate MoCha, welcome to visit my homepage to take a look, let's mourn and encourage each other.
2021/4/4	Today is Qingming Festival, I made a commemorative video, purely for mourning purposes, without any commercial activities. If you care, please visit my homepage to watch it, let's mourn and remember together.
2021/4/8	Thank you for remembering Mo 🍵 Cha. I made a video to commemorate Mo 🍵 Cha, purely for mourning purposes, without any commercial intent. If you care, please visit my homepage to watch it, let's mourn and remember together.
2021/4/20	🍵 [Blessings] 🍵
2021/4/20	Today is the ninth day of the third lunar month (around the Grain Rain season), and the weather is magical. It was sunny and warm in the morning, but turned cloudy and rainy in the afternoon. Thinking about it, it's like the heavens blessing MoCha on his birthday and then crying. Hello, there are two videos commemorating MoCha on my homepage (one self-made, one reuploaded). Welcome to watch them, let's reminisce and encourage each other. (Hoping that people who don't forget and like MoCha can come together to remember him, after all, there is strength in numbers, unity is power)
2021/11/1	MoCha's passing is a spiritual wound for a generation of young people. Although time erases the pain, the scar will forever remain in the hearts of this generation, never forgotten. [Blessings] Bilibili users really have heart, keeping MoCha's fan count at 2.021 million is quite meaningful as a commemoration (2021).

## 5.2 The Integration of Privacy and Publicity

According to Walter (2015), the advent of digital media and social networking has reshaped community groups that existed before the industrial era, resulting in a shift in the way mourning is experienced as a public cultural ritual. The heightened prominence of individuals on social media platforms entails that any personal manifestations of sorrow can be thoroughly examined by unknown individuals. Nevertheless, it should not be assumed that the death of every user will generate substantial interest on social media, nor that every online mourning event will be as lively or formal as offline gatherings. The social media audience has become consolidated, resulting in personal expressions, such as grieving for a loved one, being shared with an incredibly large group of people. This signifies a transition from privacy to publicity in the digital domain.

Although it is challenging to accurately gauge the level of self-exposure on the internet (Solove, 2007), previous studies frequently exaggerate the extent to which this privacy is made public. Analysis of the fluctuating activity in Mocha's comment section indicates that following a short period of popularity, the level of engagement within the grieving community noticeably declined, without a corresponding influx of new users. Despite the absence of technical barriers or exclusive groups, the participants in this comment community reached a stable state after a few months, with a significant decrease in visibility. The public nature of the mourning community was demonstrated solely through the availability of digital information in this process. Conversely, the limited number of active members and individuals responsible for maintaining the cemetery's grounds formed its sense of seclusion.

Thus, the online mourning community, which revolved around a regular person (the deceased), formed new socio-emotional bonds and eventually transformed into an exclusive space for a chosen few, returning to a state of calmness. This sequence demonstrates how emotional displays, facilitated by digital platforms, blend the

personal and societal domains on social media, despite their inherent inconsistencies.

### **5.3 Why do people mourn on social media?**

An examination of Mocha's video views and comment volumes over time, without taking into account long-term progress, indicates that Mocha's passing, similar to other popular news events, seemed to be a transient occurrence. It garnered significant and rapid attention within a week, but subsequently declined in public visibility. One may wonder: what is the reason behind people's decision to come to this location to grieve, and what prompts them to depart?

In a study conducted by Klastруп (2015), the author examined the relationship between the collective mourning observed on RIP pages for young individuals who were not public figures, as documented by Danish news media, and the actual deaths of these individuals. The study aimed to investigate the reasons behind people expressing condolences for individuals they do not personally know. She discovered that numerous individuals became aware of the demise and primarily accidental cause of these unfamiliar individuals through news media and subsequently visited Facebook's RIP pages to convey their condolences. However, news media were not present in Mocha's case. There was a lack of official media coverage regarding the questions of whether Mocha's parents were abusive or neglectful, or whether Mocha's situation was as tragic as rumored on the internet. However, the significance of Mocha's death was constantly apparent. Hanusch (2010) proposes that a death event which satisfies a greater number of criteria for being newsworthy, such as involving violence, accidents, celebrities, or deaths considered significant, will possess a higher level of news value. Undoubtedly, Mocha's demise, characterized by attributes of self-reliance, destitution, desertion, and malnutrition, was captivating and noteworthy. With the news media absent, the public on social platforms naturally assumed the role of media intermediaries, disseminating and deliberating on Mocha's story. As a result,

numerous unfamiliar individuals visited Mocha's video homepage during the event's news cycle, viewed his creations, and expressed their condolences.

Nevertheless, grieving on social media platforms is not exclusively for the deceased. It is perpetually accessible for others to read and examine. Therefore, the precise degree of genuine sorrow and contemplation focused exclusively on the deceased among the community remains uncertain. The analysis suggests that the high positive sentiment scores and peaceful, well-wishing themes in Mocha's comment texts can be partially accounted for.

Moreover, by eliminating the aspect of being newsworthy from Mocha's online mourning community, we can engage in conjecture regarding the characteristics of regular individuals' online mourning communities, which is the primary subject of investigation. In the absence of any captivating attributes, would the social media profile of an average individual who passes away discreetly transform into a substantial public grieving community? Based on the research findings and analysis, it is clear that the presence of digital mourning activities on social media for deceased individuals who had an average social standing is not substantial. This suggests that the cultural ritual cannot be accurately described by either public or private characteristics. The dichotomy between the terms "public" and "private" appears to have been eradicated in the digital era.

## 6 Conclusion

The narrative of Mocha, which encompasses both ordinary and emotionally distressing aspects, prompted numerous individuals to contemplate the presence of other individuals similar to Mocha in their surroundings and to contemplate the experiences and circumstances of people beyond their own privileged life. Perhaps this is the reason why numerous individuals, when learning about his narrative,

expressed heartfelt desires and humble condolences on his profile.

Studying death can be unsettling, but the Mocha mourning community expresses hopes for the deceased's afterlife and shows sympathetic sympathy for their situation. This helps to alleviate the coldness associated with death and creates a distinct cultural environment for mourning online. This exemplifies the shared sentiments of Chinese society. In order to eliminate bias in discussing the subject of grieving, this work employed computational communication approaches and utilized text data mining analysis to depict the general landscape of Mocha's mourning community, which experienced a brief period of prominence. The future study and examination of the establishment and progression of online mourning culture as a commonly accepted and routine activity among the general population are still pending.

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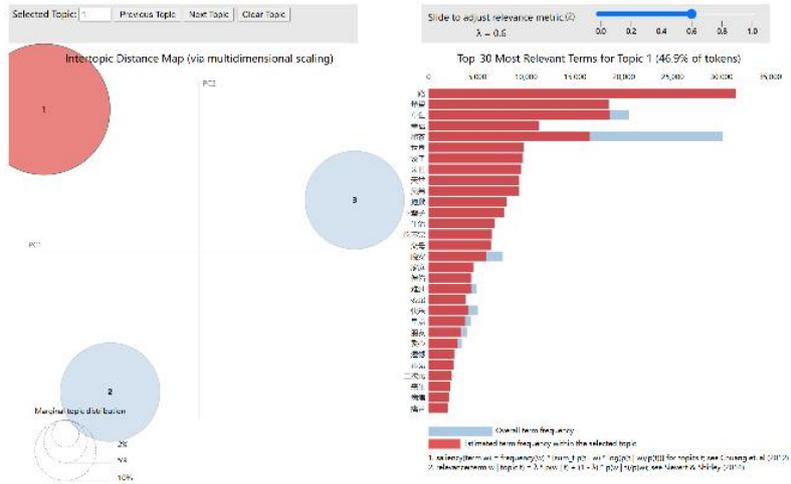


Figure 10 LDA Results for Topic 1

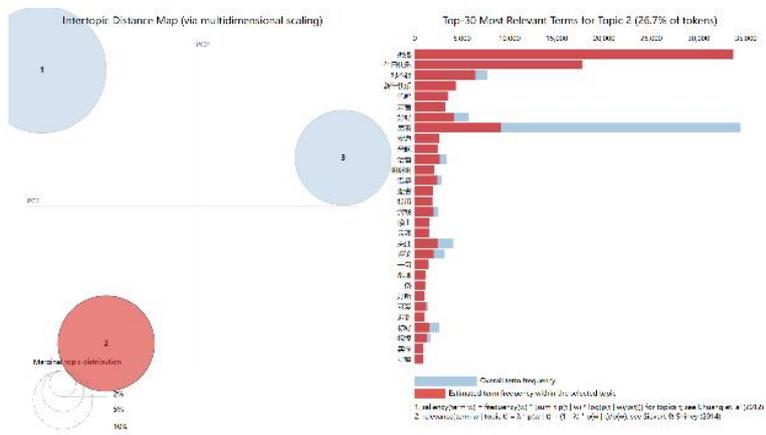


Figure 11 LDA Results for Topic 2

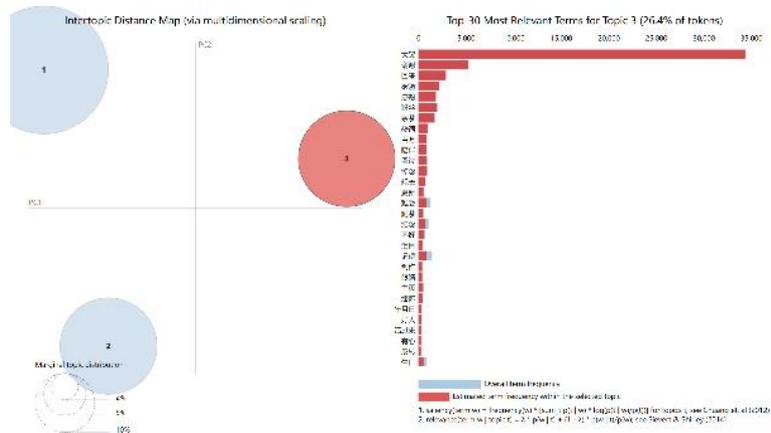


Figure 12 LDA Results for Topic3

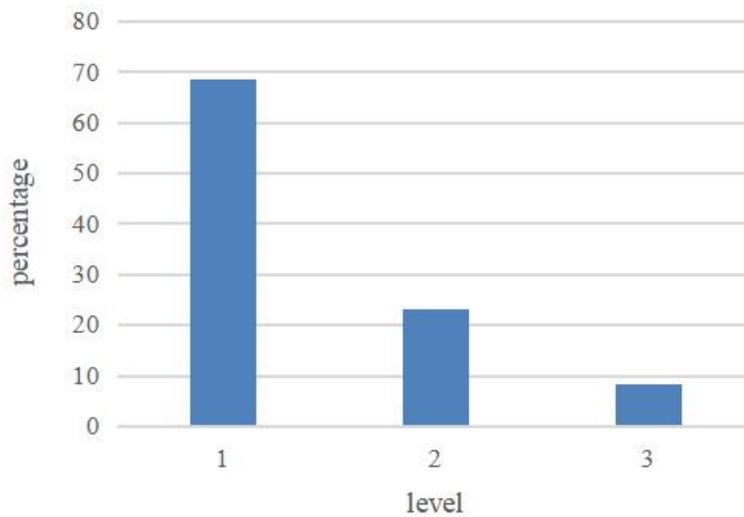


Figure 13 Number of comments at different levels

【Editor】 Ge Tengyue

# Research on Music App Users' Intentions for Continued Usage: A Study Utilizing the UTAUT Model

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**Abstract** Background of the problem: Music is an important medium for human emotion expression. While with the advent of the "music socialisation" era, the application of music app is becoming more and more widespread. Main objective: Research on music app users' usage behaviour, continuous usage intention, and influencing factors can help platform operators to continuously optimize the functions and improve the service level. Research methods: This study constructs a structural equation model of the influencing factors of music app users' willingness to use on the basis of the UTAUT model, taking into account the social affordance of the platform. A scale for measuring the factors influencing users' continuous usage intention was designed based on existing scales. After distributing questionnaires to recover sample

data, the research model was analysed with the help of SPSS v.22 and AMOS v.24. Findings: The conclusions of the data analysis show that Performance Expectancy, Social Influence, Facilitating Condition, Coordinate-Ability and Connect-Ability have a significant positive effect on usage behaviour. Effort Expectancy, Greet-Ability and Emotional-Ability did not show a significant effect on users' usage behaviour. The user's Usage Behaviour positively influences the users' Continuous Usage Intention. Contribution: The innovation of this paper is to extend the UTAUT model from a social affordance perspective.

**Key Words** music app, UTAUT model, continuous usage intention, social affordance

The development of Internet technology has not only changed the way of dissemination of music works, but also built up a unique "music social" platform<sup>[1]</sup>, which has become a new venue for people to display themselves, socialise and realise socialisation<sup>[2]</sup>. According to the 51st *China Internet Network Development Statistics Report* published by the China Internet Network Information Centre, as of 2022, China's network music user scale reached 684 million, accounting for 64.1% of Internet users<sup>[3]</sup>. The rise of music apps such as NetEase Cloud Music and QQ Music has met the demand for music communication and creative display<sup>[4]</sup>. For operators, it is important to innovate on the premise of maintaining users and improving user stickiness, making users more satisfied with the services currently provided by operators and continue to use them<sup>[5]</sup>. However, due to the lack of realistic physical interaction and extended communication during the use of music apps, users can only decide the depth of music social activities through the social cues, so the willingness of users to use the music apps depends on the technical configuration of the music apps as well as the acceptance level of the users.

Based on the previous research on the influencing factors of the Unified Theory of Acceptance and Use of Technology model (UTAUT model), this paper introduces the influencing factor of social affordance in order to expand the UTAUT model, builds the framework of the research model of this paper, and conducts an empirical study to explore the key factors affecting the continuous usage intention of the music app users, to help the operators to better understand the motivation of the user's usage behaviours, and to facilitate the high-speed development of the music app industry in China.

## 1 Literature Review

### 1.1 continuous usage intention platforms

Continuous usage intention is the level of willingness to continue to use a product or service, reflecting the attractiveness of that product or service to the users. The first acceptance of an information system is the first step towards achieving its success, while the long-term survival and ultimate success of an information system depends on its continuous usage intention <sup>[6]</sup>.

For the research object of mobile social software continuous usage intention, scholars usually choose the current development of more mature mobile social software as a specific research object, and the research results are representative and referable. The research objects mainly include WeChat <sup>[7]</sup> , MicroBlog <sup>[8]</sup> , TikTok <sup>[9]</sup> , Zhihu <sup>[10]</sup> and other social apps.

In the research method of mobile social apps continuous usage intention, most researchers use the research method of quantitative research, and some researchers conducted qualitative research. Researchers used the Perceived Value theory Model, the Uses and Gratifications Theory, the Expectation Confirmation Model, the Technology Acceptance Model, and the model of Continuous Use of Information

Systems to analyse the differences in the behaviours of different types of users <sup>[11]</sup>, and the demand for use <sup>[12]</sup>. Dong Qingxing (2019) measured perceived value through perceived benefits and perceived costs, and combined the Expectation Confirmation Model and Perceived Value Theory to construct a structural equation model of online health community users' continuous use willingness <sup>[13]</sup>. Li Xuan (2020) studied users' motivation to use and needs satisfaction through functional needs, social needs, and entertainment needs from the Uses and Gratifications Theory <sup>[14]</sup>. Dai Bao (2015) based on the Expectation Confirmation Model, combined with the Social Presence and Flow Experience Theory, which found that the dimensions of perceived usefulness and satisfaction have a significant positive effect on maintaining users' intention to continue using <sup>[15]</sup>. Liang TaiXin (2022) constructed a structural equation model of the factors influencing users' intention to use tourism information service platform based on the UTAUT model, taking into account the degree of trust, perceived risk, and product or service authority <sup>[16]</sup>. Bhattachajee (2001) combined the Expectation Confirmation Theory model and Integrated Information Technology Acceptance Model, and proposed the ECM-IT model through an empirical study of online bank, which is suitable for researching the willingness of information system users to sustain participation <sup>[17]</sup>. Some scholars have also adopted qualitative research methods, such as Cao Shujin , who constructed a conceptual model of the factors influencing the willingness to continue to use the social functions of e-book apps by capturing the Q&A texts related to the social functions of e-book apps on the "Zhihu" platform and adopting the research method of rooted theory <sup>[18]</sup>.

## 1.2 Theoretical framework of the UTAUT model

Whether the value of information technology can be effectively realised depends on the degree of user acceptance and use of the technology. In the existing research, scholars have extensively explored the user acceptance of information technology,

and different theoretical models have been proposed at different times, such as Theory of Rational Behaviour (TRA Theory) <sup>[19]</sup>, Technology Acceptance Model (TAM Model) <sup>[20]</sup>, Theory of Planned Behaviour (TPB Theory) <sup>[21]</sup>, and Theory of Diffusion of Innovations (IDT Theory) <sup>[22]</sup>, and so on. Due to the complexity of user behaviour itself and the limitations of the researchers themselves, each theory has certain limitations, and there is no theory that can cover all the influencing factors. On the basis of previous research, Venkatesh et al. further proposed the Unified Theory of Acceptance and Use of Technology Model (UTAUT), which constructs a model framework with Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Condition, and is mainly used for predicting and explaining the users' willingness to accept information technology and their acceptance behaviour <sup>[23]</sup>. The model integrates several models such as TRA, TPB, TAM, etc., which can better reflect the influence of individual users' knowledge, experience, and voluntariness on the willingness to accept information technology. The model has a wide range of applications and its effects have been generally verified. It has an explanatory power of up to 70% for user acceptance willingness <sup>[24]</sup>, and can be a good predictor of an individual's adoption of information technology <sup>[25]</sup>.

From the existing research progress, it can be seen that the UTAUT model has been used in different industries and scenarios ranges. In terms of research areas, there are more studies on new knowledge service technology <sup>[26]</sup>, mobile app <sup>[27]</sup>, e-health technology <sup>[28]</sup>, mobile payment technology <sup>[29]</sup>, etc., and the research level mainly focuses on the evolution and updating of the technology, and the guiding significance of the social media for the actual production and life.

In terms of model expansion, in different fields of research, when scholars choose the UTAUT model as the influencing factor for examining users' acceptance willingness and acceptance behaviours, they will add new examining variables to the basic model based on the characteristics of the field of research to construct a more

appropriate research model. When analysing the influencing factors affecting the willingness of elderly users to adopt technical support, Zhu Yajing (2022) added two predictors, Computer Anxiety and Perceived Stress, based on the UTAUT model, and verified that the most influential factors on the willingness of elderly users to use new technologies were effort expectations and convenience conditions, and social influence did not show a significant role <sup>[30]</sup>. Huang Jie (2021), in his study of user acceptance of infomercial advertisements in Jittery short videos, based on the short video platform and infomercial characteristics, incorporated four measurement factors of Advertisement Accuracy , Advertisement Attitudes, Perceived Risk and Advertisement Rewards based on the UTAUT model. <sup>[31]</sup> Liang Taixin (2022), in exploring the willingness to use tourism information service platform users, based on the UTAUT model, added variables such as the Degree of Trust, Perceived Risk, and the Authority of the Product or Service, which proposed a model of factors influencing the willingness to use tourism information service platform users <sup>[32]</sup>.

In summary, scholars have conducted extensive research on the use of continuous usage intention models in the field of mobile internet, but the research on the willingness to use the music app is relatively small. UTAUT model is widely used in the research of mobile Internet applications, and the results of the research in various fields have the uniqueness of their respective fields, but there are few studies to expand the UTAUT model from the perspective of the platform's social function. Therefore, this study incorporates the social affordance function of music apps on the basis of the UTAUT model, including Greet-Ability, Emotional-Ability, Coordinate-Ability and Connect-Ability, so as to explore the influencing factors of continuous usage intention of music app users.

## 2 Proposed Framework Of Study and Hypothesis Development

This paper proposes a research model based on the UTAUT model and combining existing research results. The model has 8 core variables, including Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Greet-Ability, Emotional-Ability, Coordinate-Ability and Connect-Ability, as well as two validation measurement variables which called Usage Behaviour and Continuous Usage Intention , to establish the research hypotheses of this paper:

### 2.1 Assumptions based on the Unified Theory of Acceptance and Use of Technology Model

Performance Expectancy refers to the extent to which an individual believes that using the system will help him or her to gain benefits <sup>[33]</sup>. In order to improve the functional diversity of mobile music apps and meet the increasingly diverse needs of users, service providers have developed and designed a large number of additional features <sup>[34]</sup>, so that users can clearly perceive the value provided by the platform and obtain more additional benefits. Thereby increasing the use of music apps. Based on this, this paper proposes the following hypothesis:

*H1: Performance Expectancy (PE) has a significant positive effect on Usage Behaviour (UB).*

Effort Expectancy refers to how easy an individual perceives it to use the system<sup>[33]</sup>, and the effort involved in learning and using a technology can have a direct impact on user acceptance and usage behaviour. Since the use of music app has certain requirements for various types of terminal equipment and the degree of difficulty for users to obtain, the easier the operation, the more positive the user's attitude towards using it will be. So, it is hypothesized the following hypothesis:

*H2: Effort Expectancy (EE) has a significant positive effect on Usage Behaviour*

(UB).

Social Influence refers to the perceived importance of others' belief that one should use the system. Sledgianowski investigated through his study that new users are more likely to join a social network that already has a certain size. At the same time, for new users, in the mature platform environment can learn from the experience accumulated by the old users in the process of using the system, which reduces the difficulty of its operation <sup>[35]</sup>. Therefore, the study suggested that :

*H3: Social Influence (SI) has a significant positive effect on Usage Behaviour (UB).*

Facilitating Condition refer to the extent to which individual users perceive that one or more organizational and technological infrastructure exist for the use of the system. Facilitating condition in this study refer to the degree of completeness and perceived resistance to the various technical support conditions required by users for the smooth use of the music app. The more mature the facilitating conditions are, the less resistance there is between the user and the music app, and the easier it is to increase the user's usage behaviour. Based on that, the following hypothesis will be suggested by the study:

*H4: Facilitating Condition (FC) have a significant positive effect on Usage Behaviour (UB).*

## **2.2 Assumptions based on social affordance of music apps**

Greet-Ability refers to a feature provided by a medium to users to facilitate mutual greetings and initial connections <sup>[36]</sup>. Social media users judge the perceived professionalism and credibility of content through data such as the number of likes, retweets, and followers <sup>[37]</sup>, thus expressing approval of the song and encouragement to the creator. Music apps provide the number of people who are currently listening to a song, which can be used to indicate the degree of compatibility between oneself and

other users, as well as to understand other users' frequently listened to music styles by accessing their homepages, which is defined in this thesis as the "currently listening" function. These interactive behaviours such as "liking", "sharing" and "listening" have an impact on the users' intention to use the music app. Therefore, this paper proposes the following hypothesis:

*H5: Greet-Ability (GA) has a significant positive effect on Usage Behaviour (UB).*

Emotional-Ability refers to a way provided by the medium for users to better express rich feelings <sup>[34]</sup>, thereby bringing users closer to each other and bringing them positive emotional feelings beyond the content experience <sup>[38]</sup>. Therefore, this paper tends to believe that the emotional-ability function in the music APP is a way provided by the platform to facilitate the expression of users' information, which serves to arouse users' expectation of the social process. Comments, emoticons, and private messages can be used to express the same or similar emotions to other users to generate social behaviours, based on which this paper proposes the following hypothesis:

*H6: Emotional-Ability (EA) has a significant positive effect on Usage Behaviour (UB).*

Coordinate-Ability refers to the combined use and synergy between components in multiple media systems. Functions such as "music podcast", "shopping mall", and "show tickets" are set up to provide users with a sense of presence and immersion, making their feelings about the scene and the goods more real <sup>[39]</sup>. Music app is a recording and sharing platform developed by operators to combine their lives with music <sup>[40]</sup>. The social affordance level supports users to use the platform to a greater extent and enhances the use of music app. As a result, this paper proposes the following hypothesis:

*H7: Coordinate-Ability (CDA) has a significant positive effect on Usage*

*Behaviour (UB).*

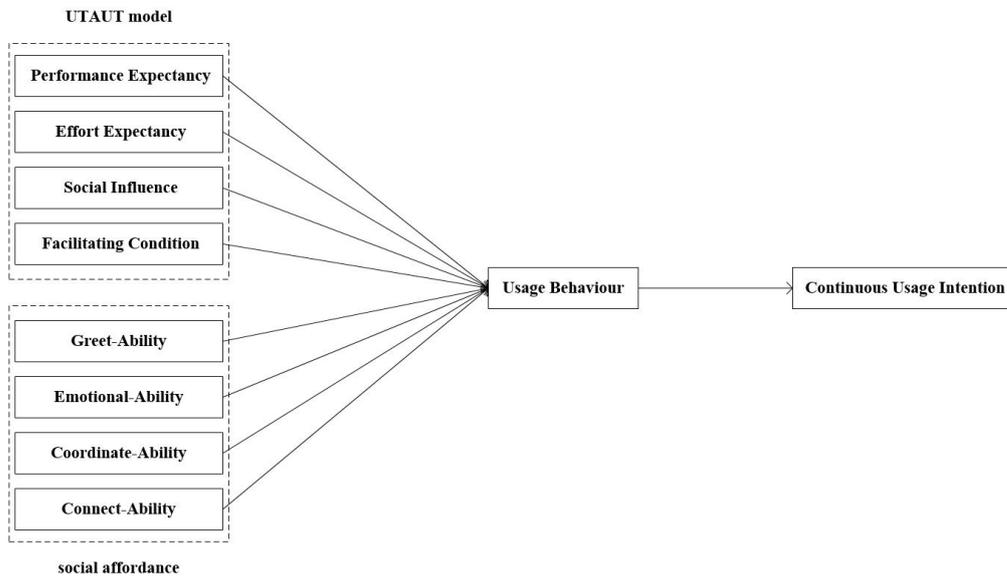
Connect-Ability refers to a series of media functions that support user group affiliation and networking provided by the platform by constructing a music social model in order to enable users to transfer emotions on the music platform [41]. For example, NetEase Cloud Music has developed the "Discover Music" section based on the personalised recommendation function of big data technology. With the accurate personalised recommendation function, users can not only find their favourite songs in the massive song list, but also find other users with similar music preferences more quickly, so as to join the activities of the community of interest to which they belong. Through the interactive song list, listening together, square and other forms of interaction to obtain a unique music emotional ties. And create emotional connections with the app, subconsciously influence the user's use of behaviour. Based on this, this paper proposes the following hypothesis:

*H8: Connect-Ability (CNA) has a significant positive effect on Usage Behaviour (UB).*

Users' usage behaviour will directly affect the continuous usage intention. Users' willingness to continue to use music apps is preconditioned by their possession of usage behaviours. Therefore, based on the above, this study articulates the following hypothesis:

*H9: The Usage Behavior (UB) has a significant positive effect on the Continuous Usage Intention (UI).*

Based on the UTAUT model and considering the social attributes of music app and related theories, this study constructs a research model of music platform users' willingness to use. The model is shown in Figure 1.



**Figure 1** The Conceptual Framework

### 3 Research Methodology

In order to ensure that the measurement scale of this study has high reliability, the measurement items used basically draw on existing literature.

This study uses quantitative approach using Unified Theory of Acceptance and Use of Technology model (UTAUT model) and Social Affordance Theory to analyze the effect of eight dimensions (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Greet-Ability, Emotional-Ability, Coordinate-Ability and Connect-Ability) on user's continuous usage intention of music apps. A self-administered questionnaire is used to gather primary data. There are 32 questionnaire items on the impact measures of user preferences and user willingness to use online music apps, 3 items on the continuous usage intention of users, 3 items on the measurement of users' usage behaviours, and 5 items about demographic variables. The study population is the music app users, while the sample focuses on

users of the aged 15 to 45 years. The selection of the population is relatable due to the data of the leading active music app users are within the age range.

The questionnaire was designed using a Likert scale. The measures ranged from "strongly agree" (7 points) to "strongly disagree" (1 point). The measurement items and reference sources are shown in Table 1.

**Table 1** Measurement Subject

Variable	Items	Subject	Bibliography
PE	Performance Expectancy	PE1 Music app can provide me with a lot of information resources and services.	Venkatesh(2003)
		PE2 Music apps can improve the efficiency and quality of my work or life.	Agarwal(2000)
		PE3 Using a music app helps me expand my social circle.	Koufaris(2002)
		PE4 Using a music app enables me to communicate more closely with my friends.	Hackbarth (2003)
EE	Effort Expectancy	EE1 I think the way to get the music app is simple.	
		EE2 I think it's easy to learn how to use a music app.	Venkatesh(2003)
		EE3 I can easily have access to end devices that support music apps. (e.g. smartphones)	Koufaris(2002)
		EE4 I think the interface of the music app is functional, clear and easy to use.	
SI	Social Influence	SI1 Many of my friends around me are using music apps which will prompt me to use them.	
		SI2 If someone important to me uses a music app, I will also want to try using it.	Venkatesh(2003)
		SI3 I don't want to look out of place when everyone around me is using music apps.	Sweeney(2001)
		SI4 I think those who use music apps in their lives are closer to everyone than those who don't.	
FC	Facilitating Condition	FC1 I can use the music app on various terminal devices.	
		FC2 Stable network and enough traffic to support my use of music apps.	Venkatesh(2003)
		FC3 I am willing to learn the knowledge necessary to use the music app and apply it.	Davis(1989)
		FC4 When I encounter difficulties in using the music app, I can get support and help from others.	Agarwal(2000)
GF	Greet-Ability	GA1 I am able to easily use features such as like, share, follow, and listen.	
		GA2 I can easily use the functions of like, sharing, following and listening.	
		GA3 When listening to music online, I can greet other users by liking, sharing, following, and listening.	Deng Xiujun (2022)
		GA4 When listening to music online, I can express simple attitudes towards other users by liking, sharing, following, and currently listening to them.	
EF	Emotional-Ability	EA1 I can easily use expressions, comments, private messages and other functions.	
		EA2 I can easily understand the meaning of expressions, comments, private messages and other functions.	
		EA3 When listening to music online, I can express vivid and rich emotions through emoticons, comments, private messages and other functions.	Deng Xiujun (2022)
		EA4 When listening to music online, I can communicate my feelings with other users through expressions, comments and private messages.	
CDF	Coordinate-Ability	CDA1 When listening to music online, I can jump between music podcasts, shopping malls, performance tickets and other functions by clicking.	
		CDA2 The jump between music podcasts, shopping malls, performance tickets and other functions is easy to understand.	
		CDA3 It is easy to jump between music podcasts, shopping malls, performance tickets and other functions.	Deng Xiujun (2022)
		CDA4 Jumps between features such as music podcasts, malls, show tickets and other functions are easy to understand.	
CNF	Connect-Ability	CNA1 When listening to music online, I can get in touch with other users through features such as Discover Music, Interactive Song List, Listen Together, Square and more.	
		CNA2 When listening to music online, I can get in touch with music creators through features such as Discover Music, Interactive Song List, Listen Together, Square and more.	
		CNA3 When listening to music online, I can get in touch with multiple users at the same time through features such as Discover Music, Interactive Song List, Listen Together, Square and more.	Deng Xiujun (2022)
		CNA4 When listening to music online, I can get in touch with other users through the functions of Discovering Music, Interactive Song List, listening Together and Square.	
UB	Usage Behaviour	UB1 I've been exposed to music apps.	Venkatesh(2003)
		UB2 I use the music app a lot.	Agarwal(2000)
		UB3 I think I can use the music app smoothly.	Koufaris(2002)
UI	Continuous Usage Intention	UI1 I will continue to use the music app in the future.	
		UI2 I will keep using that music app even more often.	Davis et al0. (1989)
		UI3 I would recommend the music app to my friends.	Venkatesh(2003)

## 4 Result and Discussion

### 4.1 Descriptive statistical analyses

The data was collected from people with certain music listening habits through an online survey, and as shown in Table 2, a sample of 265 was obtained. The sample included a slight majority of females, around 52.5%, as compared to the males with 47.5%. The respondents' age who mostly participated in this study is between 15 – 25 and 26 – 35 years old, with 46.4% and 41.1%, respectively. Moreover, in much of the sample, 58.5% had a bachelor's level of education, 34.7% have a graduate degree or above. The sample covers more than 16 professions, with students accounting for 31.7%. And lastly, the sample covers first to fifth tier cities.

**Table 2** Characteristics of the sample, Sample(n=265)

Causality	Categories	Number	Percent%
Gender	Male	126.0	47.5
	Female	139.0	52.5
Age	15-25	123.0	46.4
	26-35	109.0	41.1
	36-45	22.0	8.3
	45 and over	11.0	4.2
Educational Level	High school	18.0	6.8
	University Degree	155.0	58.5
Occupation	Post-graduate and above	92.0	34.7
	Student	84.0	31.7
	Production staff	8.0	3.0
	Sales person	9.0	3.4
	Marketing/Public Relations Officer	20.0	7.5
	Customer service staff	13.0	4.9
	Operator	19.0	7.2
	Administrative/logistics staff	14.0	5.3
	Human resources	9.0	3.4
	Finance/Audit staff	9.0	3.4
	Civilian/Clerical staff	19.0	7.2
	Technical/R&D staff	12.0	4.5
	Managerial staff	9.0	3.4
	Teacher	15.0	5.7
	Consultants	7.0	2.6
	Professionals (journalists, accountants, lawyers, medical professionals, etc.)	14.0	5.3
Address	Else	4.0	1.5
	First-tier city	74.0	27.9
	Second-tier city	86.0	32.5
	Third-tier city	68.0	25.7
	Fourth-tier city	26.0	9.8
	Fifth-tier city	11.0	4.1

## 4.2 Reliability analysis

As Table 3 shows, reliability analysis was conducted on overall variables and each of the constructs to check its internal consistency. The result showed that the overall constructs have 0.935 internal consistency with 38 items, and each construct's alpha is above 0.60. The reliability of the measures is confirmed if the value of Cronbach's alpha is more than 0.6.<sup>[42]</sup> Except for the SI4 item (CITC = 0.481) under the "Social Influence" variable, the corrected item-total score correlation (CITC) of all the questions was above 0.5, so the SI4 item was deleted. The scale designed for this study had good internal consistency for each of the questionnaire's constructs.

**Table 3** Reliability Analysis

Vatiables	Number of Items	Cronbach $\alpha$
Performance Expectancy (PE)	4	0.809
Effort Expectancy (EE)	4	0.809
Social Influence (SI)	4	0.767
Facilitating Condition (FC)	4	0.839
Greet-Ability (GA)	4	0.840
Emotional-Ability (EA)	4	0.853
Coordinate-Ability (CDA)	4	0.805
Connect-Ability (CNA)	4	0.855
Usage Behaviour (UB)	3	0.852
Continuous Usage Intention (UI)	3	0.842

The Kaiser-Meyer-Olkin (KMO) and Bartlett's Test Sphericity were observed, as shown in Table 4, to study the sample's adequacy and the correlations between the variables. In this study, KMO was 0.917 and Bartlett's Test of Sphericity was significant at  $p < 0.001$ , showing that the current data was appropriate for factor analysis. There are sufficient correlations among the variables of the study.

**Table 4** KMO & Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.917
	Approx. Chi-Square	2106.945
Bartlett's Test of Sphericity	df	120
	sig.	0.000

The influencing factors of each factor were extracted using principal component analysis. In factor rotation, the factors were analysed using the maximum variance positive rotation method. As a result of Table 5 shown, four factors had eigenvalues more than 1, indicating that the scale has good structural validity. The dimensions were well differentiated from each other. The factor loading coefficients for each measurement item were above 0.5, indicating that the items were valid. This study is suitable to make further analysis.

**Table 5** Factor Analysis

Items	Components			
	Greet-Ability (GA)	Emotional-Ability (EA)	Coordinate-Ability (CDA)	Connect-Ability (CNA)
GA1	0.793			
GA2	0.750			
GA3	0.718			
GA4	0.710			
EA1		0.779		
EA2		0.759		
EA3		0.746		
EA4		0.729		
CDA1			0.773	
CDA2			0.750	
CDA3			0.716	
CDA4			0.706	
CNA1				0.772
CNA2				0.770
CNA3				0.757
CNA4				0.738

Further data processing used SEM. Confirmatory Factor Analysis (CFA) was conducted to test the validity and reliability of variables used based on the measurement model analysis. According to Hair et al. [43], the variable can be judged as valid if it has a standardized loading factor greater than or equal to 0.50. Furthermore, Hair et al. [44] state that the reliability of a variable has a construct reliability value greater than or equal to 0.7 and an extracted variance value greater than or equal to 0.5.

According to Table 6, the standard loading factor value greater than or equal to 0.5, construct reliability value greater than or equal to 0.7, and an extracted variance value greater than or equal to 0.5. Therefore, all measures used in this research are reliable.

**Table 6** Results of Validation Factor Analysis

Variable	Measure Item	Factor Loading	CR	AVE
Performance Expectancy	PE1	0.774	0.807	0.512
	PE2	0.696		
	PE3	0.682		
	PE4	0.707		
Effort Expectancy	EE1	0.706	0.811	0.518
	EE2	0.664		
	EE3	0.772		
	EE4	0.732		
Social Influence	SI1	0.724	0.759	0.514
	SI2	0.776		
	SI3	0.645		
Facilitating Condition	FC1	0.776	0.84	0.569
	FC2	0.696		
	FC3	0.776		
	FC4	0.765		
Greet-Ability	GA1	0.722	0.844	0.576
	GA2	0.802		
	GA3	0.8		
	GA4	0.708		
Emotional-Ability	EA1	0.83	0.856	0.598
	EA2	0.825		
	EA3	0.721		
	EA4	0.709		
Coordinate-Ability	CDA1	0.675	0.806	0.51
	CDA2	0.684		
	CDA3	0.766		
	CDA4	0.727		
Connect-Ability	CNA1	0.767	0.856	0.598
	CNA2	0.729		
	CNA3	0.802		
	CNA4	0.794		
Usage Behaviour	UB1	0.815	0.857	0.666
	UB2	0.857		
	UB3	0.774		
Continuous Usage Intention	UI1	0.818	0.846	0.647
	UI2	0.842		
	UI3	0.751		

The discriminant validity between each latent variable was analysed, where the square root of AVE should be above the correlation coefficient test for paired variables. The results are shown in Table 7, where the diagonal lower triangles are the correlation coefficients, and the correlation coefficients between the variables in the table are less than the square root values of the corresponding AVE, which suggests

that there is a certain degree of correlation between the latent variables, and that the scale's discriminant validity is desirable.

**Table 7** Discriminant Validity

	PE	EE	SI	FC	GA	EA	CDA	CNA	UB	UI
PE	<b>0.716</b>									
EE	0.57	<b>0.72</b>								
SI	0.686	0.645	<b>0.717</b>							
FC	0.539	0.587	0.633	<b>0.754</b>						
GA	0.304	0.23	0.285	0.315	<b>0.759</b>					
EA	0.236	0.22	0.246	0.319	0.724	<b>0.773</b>				
CDA	0.414	0.197	0.414	0.388	0.554	0.579	<b>0.714</b>			
CNA	0.395	0.303	0.43	0.331	0.655	0.599	0.671	<b>0.773</b>		
UB	0.63	0.527	0.649	0.571	0.504	0.48	0.633	0.618	<b>0.816</b>	
UI	0.301	0.199	0.331	0.253	0.517	0.409	0.485	0.608	0.596	<b>0.804</b>

### 4.3 Regression analysis

In order to verify whether there is a multicollinearity relationship between the variables, this study used multiple regression analyses. The independent variables includes Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Greet-Ability, Emotional-Ability, Coordinate-Ability and Connect-Ability while the dependent variable is Usage Behaviour. The p-value of "Greet-Ability" and "Emotional-Ability" were tested to be above 0.05 and had no significant effect on Usage Behaviour, so these two variables were deleted.

### 4.4 Structural modelling tests

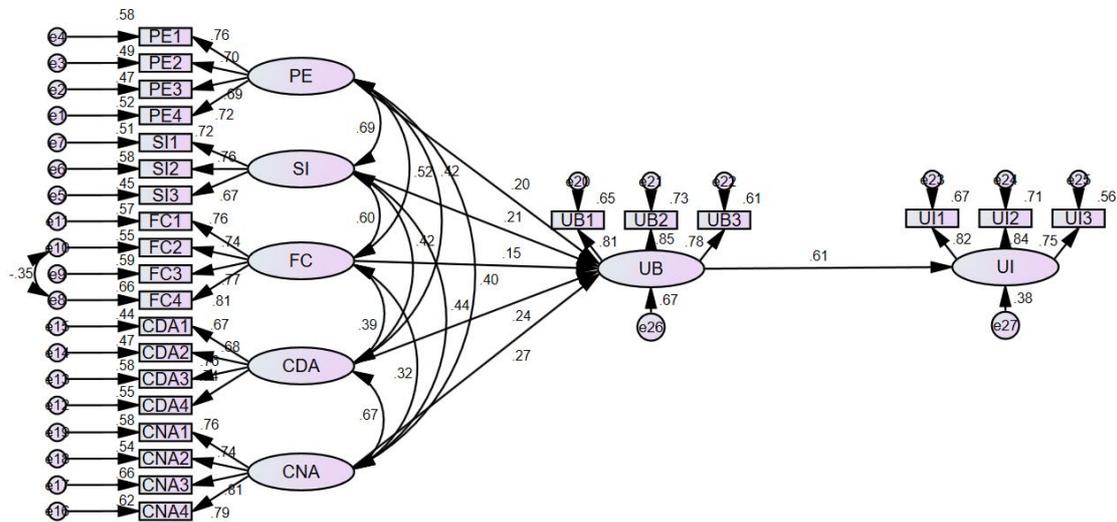
In this study, AMOS v.24 is used as a tool to test the structural equation modeling of the pre-determined theoretical model. In order to ensure the consistency between the experimental results and the theoretical model, the experimental data should meet the fitting criteria. Through the above analyses, the theoretical model after removing the variables of "Greet-Ability""Emotional-Ability and "SI4" was tested, and the fit indexes of each model are as follows: CMIN/DF=1.367,RMR=0.052,GFI = 0.889,AGFI = 0.864,RFI = 0.860,RMSEA= 0.037. According to the fit criteria for structural equation models, the values of GFI,

AGFI, and RFI need to be above 0.9, and the data show that multiple paths in the model are not significant. The data shows that the multiple paths in the model are not significant. The test comparison can be seen that the initial model fit is not satisfactory, so the model needs to be corrected.

Based on the correction indexes given by the AMOS v.24, one path is corrected at a time according to the principle, and each correction is calculated. The correction process is as follows: 1) After deleting the insignificant path "Effort Expectancy", the significant coefficients among the paths of the model are obviously improved. 2) Covariance is established for the residual term of "Facilitating Condition", and all the paths are significant. After the model correction, the model fit indexes are as follows: CMIN/ DF = 1.272, RMSEA = 0.032, RMR = 0.049, GFI = 0.909, CFI = 0.977, NFI = 0.902, TLI = 0.973, IFI = 0.977, and all indexes meet the requirements. The modified path test is shown in Table 8, and the correlation coefficients after the modified model are shown in Figure 2.

**Table 8 Path Test Results**

Irems	Influence Pathway	Standardized Coefficient	Unstandardized Coefficient	S.E.	C.R.	P
H1	<---Performance Expectancy	0.197	0.18	0.077	2.322	0.02
H3	<---Social Influence	0.207	0.195	0.091	2.142	0.032
H4	<---Facilitating Condition	0.146	0.13	0.061	2.115	0.034
H7	<---Coordinate-Ability	0.239	0.233	0.08	2.912	0.004
H8	<---Connect-Ability	0.273	0.216	0.062	3.468	***
H9	Continuous Usage Intention <---Usage Behaviour	0.614	0.611	0.074	8.21	***



**Figure 2** Modified model of continuous usage intention music platforms and standardised coefficients

## 5 Findings and Results

In summary, the hypothesis testing results of this study are shown in Table 9, based on the above data testing results, most of the hypotheses proposed in this study were confirmed, and some hypotheses failed the test. Among them, "Performance Expectancy", "Social Influence", "Facilitating Condition", "Coordinate-Ability" and "Connect-Ability" all directly affect music app users' use behaviour, which in turn affects users' continuous usage intention; "Effort Expectancy""Greet-Ability" and "Emotional-Ability" do not have a significant impact on music app users' use behaviour. The specific analyses are as follows:

**Table 9** Results of Hypothesis Testing

No	Hypothesis	Inspection Results
H1	Performance Expectation (PE) has a significant positive effect on Usage Behaviour (UB).	tenable
H2	Effort Expectation (EE) has a significant positive effect on Usage Behaviour (UB).	untenable
H3	Social Influence (SI) has a significant positive effect on Usage Behaviour (UB).	tenable
H4	Facilitating Condition (FC) have a significant positive effect on Usage Behaviour (UB).	tenable
H5	Greet-Ability (GA) has a significant positive effect on Usage Behaviour (UB).	untenable
H6	Emotional-Ability (EA) has a significant positive effect on Usage Behaviour (UB).	untenable
H7	Coordinate-Ability (CDA) has a significant positive effect on Usage Behaviour (UB).	tenable
H8	Connect-Ability (CNA) has a significant positive effect on Usage Behaviour (UB).	tenable
H9	The Usage Behavior (UB) has a significant positive effect on the Continuous Usage Intention (UI).	tenable

Performance Expectancy have a greater positive impact on Usage Behaviour, which indicates that people value the ability of music apps to provide effective value and services in their life and work. Users' willingness to use music apps will increase if using the apps can bring them subjective benefits. In the Internet economy, people's demand for the "usefulness" of the platform increases. Music apps need to improve their service quality and enrich their song libraries to maximise the satisfaction of users' search and download needs.

Effort Expectancy has no significant effect on Usage Behaviour, which can be explained by the fact that young and middle-aged users aged 15-35 accounted for 87.5% of the users in this study. The difficulty of operating music apps, access to them, and the performance of the terminal equipment do not have much influence on this group.

Social Influence positively affects Usage Behaviour towards music apps, which

indicates that users' intention to use music apps cannot be separated from the influence of the community environment. Music apps need to guide users to give feedback on their feelings of use, opinions on improvement, and other information to obtain a highly efficient user response rate. Major operators should increase advertising to improve the platform's reputation and create a positive community environment to increase users' continuous usage intention.

Facilitating Condition positively influence users' Usage Behaviour of music apps. Under a good and convenient usage environment, the difficulty for users to operate the music app is reduced. If the feedback of users during the use period can be handled properly, so that users can relieve their negative emotions in time, it can also lead to the transformation of the use behaviour into continuous usage intention.

Greet-Ability and Emotional-Ability have no significant effect on users' Usage Behaviour. These indicates that the functions of liking, sharing, commenting, emoticons, and private messages are less supportive of users' music app usage behaviour. Users are more concerned with rational needs such as "listening to songs" and "searching for songs".

Coordinate-Ability have a significant impact on users' Usage Behaviour, which indicates that music apps provide convenient channel expansion functions to ensure that users can find the music-related derivatives and information they need, which in turn strengthens users' attitude and emotion towards music apps and increases the motivation to use them. Music app administrators can provide users with one-stop music peripheral services through the design of convenient and rich skip functions, and combine music with users' lives to a greater extent.

Connect-Ability has a significant positive impact on Usage Behaviour, indicating that the technical support provided by music apps for users' community aggregation and relationship network extension can eliminate the gap between users, improve communication efficiency, generate and maintain community relationships, and be

more conducive to increasing user stickiness. In order to better satisfy the users' demand for emotional connection, music app administrators can dig deeper into the music circle, provide more care and services, and stimulate emotional communication among users.

The Usage Behaviour of music app can significantly influence users' Continuous Usage Intention. This indicates that the development, operation and maintenance of music app need to be deeply integrated with users' needs. Platform operators should take effective measures to enhance users' continuous usage intention music apps by dynamically perceiving users' needs.

## Conclusion

From the perspective of information technology acceptance theory, this paper explores the impact of the UTAUT model and the extended music app social affordance on users' continuous usage intention, and verifies the influence paths of Performance Expectancy, Social Influence, Facilitating Condition, Coordinate-Ability, and Connect-Ability on users' continuous usage intention. The study enriches the expanded perspective of UTAUT model and its application in the research of platform continuous use intention at the theoretical level, and also guides the direction of music APP's technology development and management operation.

The empirical results show that music apps should improve user loyalty by enriching the content of music libraries, developing music communities, creating convenient conditions, providing one-stop music peripheral services, and actively improving the technology needed for user aggregation and relationship network extension. Operators can make further efforts from various angles, such as music library content building, function building, and advertising. Due to time and energy constraints, the sample size of this study is not yet large enough, and among the

sample groups covered, there are more young and middle-aged users, and there is still room for research on the moderating effect of age on this group's continuous usage intention. In addition, other influencing factors and related laws can be further explored in the future.

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