

“Happiness in Bubble”: a study on the relationship between the media affordances of the K-pop fan platform Bubble and user well-being

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Abstract. In recent years, the K-pop market has been experiencing a booming growth trend. Among them, the Korean entertainment software "Bubble" is a software that almost every fan who loves K-pop idols will download. It can fulfill the wish of fans to have one-on-one chats with their idols. To explore whether the design of "Bubble" software can make fans feel a sense of happiness when using it, this thesis studied multiple variables, including the availability of the software, the degree of quasi-social interaction, loneliness, and the relationship between these variables and happiness. A large number of questionnaires were distributed on Chinese social platforms such as Weibo, Xiaohongshu, Douyin, etc., which have a large number of users belonging to the K-pop fan group. Using the data analysis method of SPSS regression analysis, the conclusion was drawn: The immersion, authenticity, and interactivity provided by the software can all play a positive and significant role in enhancing the happiness of fans.

Keywords: affordance, para-social interaction, loneliness, happiness

1. Introduction

In recent years, the concept of subjective well-being has gained significant attention in academic research. As living standards have improved and economic conditions are no longer as challenging as they once were, individuals are increasingly prioritizing psychological well-being over mere material satisfaction. This shift has led to the rising importance of emotional value in consumer behavior, with various industries adapting their branding strategies to provide not only functional benefits but also emotional satisfaction to their customers. The growing emphasis on psychological experiences in public discourse reflects a broader societal trend: the pursuit of happiness is often regarded as the ultimate goal of human existence.

However, this study narrows its scope to a specific population—fans engaged in idol fandom, particularly those who use the digital platform “Bubble” for celebrity-fan interactions. It aims to explore whether the affordances provided by this platform can enhance users’ perceived happiness. While the phenomenon of celebrity worship has been widely studied, research focusing on digital affordances in fan engagement remains relatively limited. Furthermore, this study incorporates para-social interaction and loneliness as mediating variables, providing a more comprehensive framework for understanding how digital engagement with idols affects fans’ well-being.

Although some prior studies have examined the relationships among parasocial interaction, loneliness, and happiness, few have explored the role of digital affordances—a relatively objective and tangible factor—in influencing these subjective psychological experiences. This research contributes to the literature by integrating affordance theory with parasocial interaction theory in the context of fan platforms, thereby expanding the application of both theoretical perspectives.

To ensure robust findings, this study employs a large-scale online survey distributed across major Chinese social media platforms, including Douyin (TikTok China), Weibo, Xiaohongshu (RED), and WeChat. Data are analyzed using SPSS and PROCESS macro, ensuring methodological rigor and statistical reliability. While the research focuses on a niche audience, the findings remain valuable for understanding fan behavior in digital environments. Ultimately, this study seeks not only to provide theoretical insights but also to help fans better understand their engagement with idol-related digital platforms, fostering a more rational and psychologically beneficial approach to fandom.

2. The interpretation and definition of research variables

2.1. Overall analysis and hypothesis regarding the selection of research variables

The research variables in this study include, as already explained in the previous text, multiple aspects of the affordances of the 'Bubble' software, the degree of para-social interaction that fans experience when using the software, the sense of loneliness that fans feel after using the software, and the sense of happiness that fans experience after using the software.

2.1.1. Independent variable: affordances

Affordance understanding is concerned with the possible set of actions that an environment allows to an actor [1]. The 'Bubble' software, as an electronic environment, also has many affordances. In the research, the aspects of immersion, interactivity and authenticity are taken as the research objects for the affordances of the 'Bubble' software. The page design of the software can provide fans with a strong sense of immersion. The idol sends messages to each fan in a group manner, and the fans receive them in the form of private messages and can reply to their idols themselves. The content of the replies can also be seen by the idol, which is an embodiment of interactivity and authenticity. Generally, the consensus which is mentioned by Nilsson and Serafin seems to be that immersion involves being or feeling surrounded by something [2]. Moving on to interactivity, Blattberg and Deighton define interactivity as the facility for persons and organizations to communicate directly with one another regardless of distance or time [3]. Ultimately, Lehmen et al. concluded that from the perspective of psychological essentialism, authenticity is the connection between an entity and a person, place [4], or time as claimed according to Medin and Ortony [5]. This study takes three affordances: 'immersion', 'interactivity' and 'authenticity' in the 'Bubble' software as the independent variables for the research. The reason of the research chose affordances as the independent variable is that up to now, the research on affordances mainly focuses on its influence on user behavior, while there are still relatively few studies on the relationship between affordances and psychological feelings (such as happiness) or subjective experiences (such as the degree of para-social interaction). Therefore, this study aims to explore this new direction and fill the gaps in existing research.

According to Cohen, the immersion can improve the emotional connection between audiences and virtual character or media content, while Blascovich and Bailenson claim that the improvement of interaction performance in the virtual environment can develop users' social interaction with others [6, 7]. Additionally, Yuan and Gao point out that authenticity is one of the factors that influence psychological mechanisms of para-social interaction in social media [8]. So it is hypothesized:

H1a: Immersion can positively influence the degree of para-social interaction.

H1b: Interactivity can positively influence the degree of para-social interaction.

H1c: Authenticity can positively influence the degree of para-social interaction.

2.1.2. Mediating variable: the degree of para-social interaction and the loneliness

The concept of para-social was first introduced by Horton and Wohl, they stated that the illusion of a direct, face-to-face interaction that audiences experience with performers is a kind of seeming face-to-face relationship between spectator and performer, which is called a para-social relationship [9]. Additionally, according to Horton and Wohl, this phenomenon is facilitated by emerging mass media—such as radio, television, and film—which create a sense of intimacy between the audience and media figures.

Next, according to Hawkey and Cacioppo, loneliness is defined as a distressing feeling that accompanies the perception that one's social needs are not being met by the quantity or especially the quality of one's social relationships [10].

This study selects the degree of para-social interaction as the first mediating variable because it effectively bridges the relationship between software availability and loneliness. By doing so, it facilitates a gradual transition in the research framework toward users' psychological experiences, ultimately leading to the dependent variable—happiness. Furthermore, the concept of para-social interaction aligns closely with the type of relationship that Bubble software cultivates between idols and fans, making it a particularly suitable mediating variable.

Loneliness, the second mediating variable, which is a concept that is relatively in opposition to happiness, can enhance the comprehensiveness and criticality of this research a lot. Moreover, since it has a direct inverse relationship with happiness, it can bring about intuitive data analysis results. Those are reasons the study chose it to be one of the variables.

By reviewing the work of Kuczynski et al., it is investigated the unique effects of the quantity and quality of social interactions on daily depressive moods and feelings of loneliness [11]. The results indicated that engaging in more frequent and higher-quality social interactions could prevent daily depressive moods and feelings of loneliness, which means in a certain sense, para-social interaction—considered a kind of social interaction—can help people reduce their sense of loneliness. So this study hypothesizes:

H2: The degree of para-social interaction negatively affects loneliness.

2.1.3. Dependent variable: happiness

Happiness, or more broadly called well-being, was defined into three dimensions in Diener, which are Life satisfaction, Positive affect and Low negative affect [12]. It has become a major topic in many fields like economics, psychology, public policy and so

on. In this research, happiness is regarded as the dependent variable, aiming to explore the relationship between the use of ‘Bubble’ software and the happiness of users and whether using ‘Bubble’ really brings fans a sense of happiness, making the money they spend worthwhile. Then, as people know from common sense:

H3: Loneliness has a negative impact on happiness.

2.2. Research model

To sum up, this study has constructed the research model as shown in Figure 1.

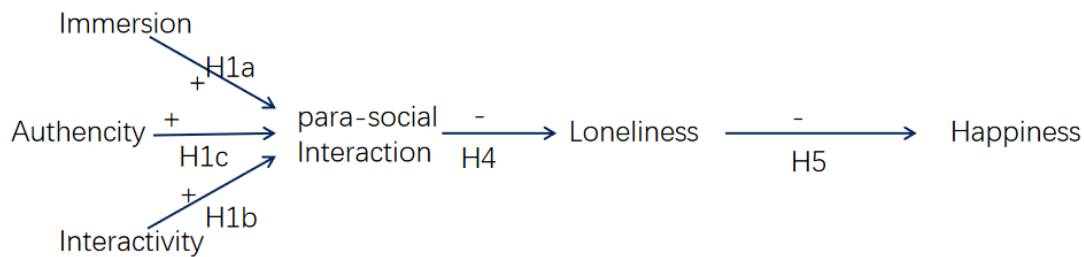


Figure 1. Hypothesized research model of six variables and five hypotheses

3. Design of measurement scales and questionnaires

3.1. Measurement scale of each variable

There are several variables in the research, excluding the Affordance do not have the measurement scale that is professional and have been specifically researched and certified by previous studies. Other variables all used the professional scales that were designed by some experts before.

3.1.1. The measurement scale of para-social interaction

According to Rubin, Perse, and Powell, which are the origins of Para-Social Interaction Scale (PSIS), the PSIS has been improved and developed into a 10-item short form based on the 20-item scale in 1987 [13]. It adopts the Likert 7-point scale, where 1 indicates ‘strongly disagree’ and 7 indicates ‘strongly agree’. The PSIS scale mainly measures the para-social interaction between fans and virtual characters or idols, and is applicable to emotional interaction within social media and online culture [14]. It is particularly relevant in studies examining the role of social media, digital influencers, and virtual communities, providing valuable insights into the psychological mechanisms underlying parasocial relationships in contemporary media environments. Thus, this research chooses to use the PSIS.

3.1.2. The measurement scale of loneliness

Moreover, the research uses the University of California, Los Angeles (UCLA) Loneliness Scale, which was designed by Russel in 1996 [15]. The scale has more than one version and this research chose version 3, which is the most commonly used one. This scale is normally used to assess the individual's sense of social isolation and emotional loneliness and it consists of multiple items assessing an individual's perceived social connectedness, emotional closeness, and the frequency of feeling excluded or lacking companionship. It has been extensively validated across different populations and is commonly applied in psychological and sociological research to examine the impact of loneliness on mental well-being and social behaviors. Therefore, the scale appropriate for the measurement of loneliness is presented in this paper.

3.1.3. The measurement scale of happiness

Finally, the paper uses the Subjective Well-Being Scale (SWB), which is a comprehensive concept that encompasses multiple dimensions such as life satisfaction, positive emotions and negative emotions [16]. As a psychological construct, SWB was first conceptualized and extensively developed by Diener in 1999. Diener introduced SWB as a broad framework for understanding individuals' self-reported well-being. His seminal paper, ‘Subjective Well-Being’, published in *Psychological Bulletin*, laid the foundation for decades of research on happiness and well-being. Since then, SWB has become a fundamental concept in

psychology. Moreover, the Satisfaction With Life Scale (SWLS) is the main scale used to measure and design the SWB [17]. Besides SWLS, there is Positive and Negative Affect Schedule (PANAS), which is also a scale that was used to develop SWB [18].

3.2. Questionnaires design

This research focuses on the influence of three different kinds of affordances in the design of the 'Bubble' software on the sense of happiness of the fans who use 'Bubble'. In the research, the three affordances: immersion, interactivity and authenticity are independent variables, while the degree of para-social interaction and loneliness are mediating variables, and happiness is the dependent variable. The questionnaire questions are classified into four parts based on different variables for measurement.

When investigating the impact of the affordances of the measurement software on the degree of para-social interaction, since no such scales have been designed by previous researchers, this study has designed a few simple questions that can directly enable respondents to express their perception of the software's usability. For example, 'I feel that the use of Bubble brings me a sense of immersion', and a 5-point scale has been adopted for measurement, with 1 indicating 'strongly disagree' and 5 indicating 'strongly agree'. Additionally, In order to enable the respondents to directly answer the relationship between availability and the degree of para-social interaction, this questionnaire also asked a question again after the measurement part of para-social interaction was completed: 'Which characteristics of the bubble do I agree with the above view (the measurement part of para-social interaction)', (In order to avoid that the respondents might not know what affordances means, the word 'characteristics' was used instead in the question.) and designed three separate options for affordances in the answer section, setting the question as a multiple-choice one. When conducting the calculation for the questionnaire, it will be carried out in the form of dummy variables. If the respondent selects an option, it will be represented by '1' in the data view; if not selected, it will be represented by '0' in the data view. This way, it is possible to directly count the affordances that users are likely to have enhanced the degree of para-social interaction between themselves and the idol. There is no need to conduct complex data calculations without a standard scale, thus preventing the generation of more inaccurate results.

The second part is the measurement section for the degree of para-social interaction. The items of the PSIS scale cover three dimensions: Emotional attachment, Perceived closeness and Interaction expectation. This questionnaire directly adapts the questions according to the research purpose (for example, the original question of PSIS was: 'I feel like I have a personal relationship with [media figure]', in this study, the question was modified to: 'I feel like I have a personal relationship with my idol'), and uses a 7-point scale as required, where 1 indicates "strongly disagree" and 7 indicates "strongly agree".

Next, when measuring loneliness, the questionnaire has deleted many items from the UCLA Loneliness Scale. In UCLA version 3, there are 20 questions included. In this study, six questions were finally selected based on the research purpose. The reason is that a questionnaire that is too long may cause respondents' aversion or discomfort, and they may refuse to answer it. In order to collect as many questionnaires as possible, the number of questions needs to be few and precise. Moreover, in the loneliness section, the 5-point scale is still used, just like in the measurement of affordances.

Finally, in the section of happiness measurement, the questionnaire has also deleted many questions in SWB. Since SWB also includes different dimensions, they are life satisfaction, positive affect, and negative affect. Among these, considering the research purpose, life satisfaction is not the aspect the study is going to measure. Thus, the questionnaire still leaves only six questions that are in the dimension of positive and negative affect.

4. Source of questionnaire data and data analysis

4.1. Source of questionnaire data

This research utilized the questionnaire platform Wenjuanxing to design and distribute questionnaires. Wenjuanxing is a comprehensive data collection, analysis, and management platform that integrates online questionnaire surveys, examinations, 360-degree evaluations, forms, assessments, and voting functionalities. Since its launch in 2006, the platform has experienced significant growth, with users cumulatively publishing over 305 million questionnaires and collecting more than 23.245 billion responses. The platform's extensive user base includes over 3 million enterprises, encompassing more than 90% of domestic universities and research institutions, as well as over 120 Fortune Global 500 companies. This widespread adoption underscores Wenjuanxing's authority and reliability in the field of online surveys.

In addition, the questionnaire consists of a total of 21 questions, and it has been published to a lot of media platforms in China, including Douyin (TikTok China), Weibo, Xiaohongshu (RED), and WeChat. This way, it can ensure that the questionnaires are randomly distributed to basically every region across the whole of China, and there will no longer be any problem of regional differences in China. Also, since only people who are interested in the topic of this questionnaire are willing to spend some time to finish the questionnaire, the requirement of the respondents, namely that they must be fans of KPOP who use the 'Bubble' software, has also been fulfilled. Ultimately, this questionnaire received a total of 287 responses from various regions in China.

4.2. Data analysis

The study uses the SPSS and PROCESS macro from IBM to carried out regression analysis on multiple variables, ensuring methodological rigor, statistical reliability and the accuracy of calculating multiple variables and multiple paths.

Now here, Tables below present the data analysis for the first research hypothesis path:

A. Immersion—Para-social interaction—Loneliness—Happiness.

OUTCOME VARIABLE:

Para-social_avg

Table 1. The Model Summary of regression analysis among immersion and degree of para-social interaction

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.7313	0.5347	0.6062	327.5628	1.0000	285.0000	0.0000

Table 2. The Model of regression analysis among immersion and degree of para-social interaction

Model						
	coeff	se	t	p	LLCI	ULCI
constant	2.1013	0.1794	11.7110	0.0000	1.7481	2.4545
Immersion_1	0.7841	0.0433	18.0987	0.0000	0.6988	0.8694

The first group of regression analysis is shown in the Table 1 and Table 2, with immersion to be the predictor variable and para-social interaction to be the dependent variable. It presents that the correlation between the immersion and para-social interaction is relatively strong ($R = 0.7313$, $R^2 = 0.5347$), with the model explaining 53.47% of the variance in the dependent variable, the para-social interaction. The model is statistically significant, $F(1,285) = 327.5628$, $p < 0.001$. The predictor variable immersion had a significant positive effect on para-social interaction ($B = 0.7841$, $SE = 0.0433$, $t = 18.0987$, $p < 0.001$), with a Confidence Interval (CI) of [0.6988, 0.8694].

OUTCOME VARIABLE:

Loneliness_avg

Table 3. The Model Summary of regression analysis among immersion, degree of para-social interaction and loneliness

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.7349	0.5400	0.4312	166.7166	2.0000	284.0000	0.0000

Table 4. The Model of regression analysis among immersion, degree of para-social interaction and loneliness

Model						
	coeff	se	t	p	LLCI	ULCI
constant	0.2611	0.1842	1.4179	0.1573	-0.1014	0.6236
Immersion_1	0.1760	0.0536	3.2857	0.0011	0.0706	0.2814
Para-social_avg	0.4920	0.0500	9.8492	0.0000	0.3937	0.5904

Here comes the second group of data, which is shown in Table 3 and Table 4, this regression model predicting loneliness also show a strong relationship, with $R = 0.7349$ and $R^2 = 0.5400$, explaining 54.00% of the variance in the outcome variable. The model is statistically significant, $F(2,284) = 166.7166$, $p < 0.001$. Both predictor variables had significant effects: immersion ($B = 0.1760$, $SE = 0.0536$, $t = 3.2857$, $p = 0.0011$, 95% CI [0.0706, 0.2814]) and para-social interaction ($B = 0.4920$, $SE = 0.0500$, $t = 9.8492$, $p < 0.001$, 95% CI [0.3937, 0.5904]). These findings suggest that both immersion and para-social interaction contribute significantly to variations in loneliness.

OUTCOME VARIABLE:

Happiness_avg

Table 5. The model summary of regression analysis among immersion, degree of para-social interaction, loneliness and happiness

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.8787	0.7721	0.1678	319.6291	3.0000	283.0000	0.0000

Table 6. The model of regression analysis among immersion, degree of para-social interaction, loneliness and happiness

Model						
	coeff	se	t	p	LLCI	ULCI
constant	0.4778	0.1153	4.1442	0.0000	0.2508	0.7047
Immersion_1	0.0830	0.0340	2.4370	0.0154	0.0160	0.1500
Para-social_avg	0.2220	0.0361	6.1510	0.0000	0.1510	0.2930
Loneliness_avg	0.4973	0.0370	13.4366	0.0000	0.4245	0.5702

Thirdly, the last group of data for the first path, shown in Table 5 and Table 6, still display that the relationship between all variables is strong, with $R = 0.8787$ and $R^2 = 0.7721$, explaining 77.21% of variance in happiness. Same as above, the model is still statistically significant, with $F(3,283) = 319.6291$, $p < 0.001$. Additionally, all of three predictor variables have strong impact on the happiness: immersion ($B = 0.0830$, $SE = 0.0340$, $t = 2.4370$, $p = 0.0154$, 95% CI [0.0160, 0.1500]), para-social interaction ($B = 0.2220$, $SE = 0.0361$, $t = 6.1510$, $p < 0.001$, 95% CI [0.1510, 0.2930]) and loneliness ($B = 0.4973$, $SE = 0.0370$, $t = 13.4366$, $p < 0.001$, 95% CI [0.4245, 0.5702]). In summary, all three predictor variables are also highly correlated with happiness.

Table 7. Direct effects of immersion on happiness

Direct effect of X on Y					
Effect	se	t	p	LLCI	ULCI
0.0830	0.0340	2.4370	0.0154	0.0160	0.1500

Table 8. Indirect effects of immersion on happiness

Indirect effect (s) of X on Y				
	Effect	BootSE	BootLLCI	BootULCI
TOTAL	0.4535	0.0401	0.3768	0.5346
Ind1	0.1741	0.0371	0.1039	0.2509
Ind2	0.0875	0.0269	0.0376	0.1444
Ind3	0.1919	0.0293	0.1386	0.2555

Table 9. Indirect effect key of immersion on happiness

Indirect effect key					
Ind1	Immersion_1	->	Para_social_avg	->	Happiness_avg
Ind2	Immersion_1	->	Loneliness_avg	->	Happiness_avg
Ind3	Immersion_1	->	Para_social_avg	->	Loneliness_avg
				->	Happiness_avg

Finally, Table 7-9 present the direct and indirect effects of immersion on happiness. The direct effect of immersion on happiness is statistically significant ($B = 0.0830$, $p = 0.0154$, 95% CI [0.0160, 0.1500]). However, the indirect effects reveal a more substantial role of mediating variables in explaining the relationship.

The total indirect effect of immersion on happiness is 0.4535, with a 95% confidence interval of [0.3708, 0.5346], indicating a highly significant mediating effect. Specifically, three mediation pathways were identified: (1) immersion influences happiness through para-social interaction ($B = 0.1741$, 95% CI [0.1039, 0.2509]); (2) immersion affects happiness via loneliness ($B = 0.0875$, 95% CI [0.0376, 0.1444]); and (3) a more complex pathway where immersion first affects para-social interaction, which then impacts loneliness, ultimately leading to happiness ($B = 0.1919$, 95% CI [0.1386, 0.2555]).

These findings suggest that while immersion has a small but significant direct effect on happiness, its primary influence operates through indirect pathways, particularly via para-social interaction and loneliness. This underscores the importance of mediating variables in understanding the relationship between immersion and happiness.

Below this, there will be other data tables presenting the process of data analysis of the paths with another two different affordances. The analysis method used is exactly the same as that for the immersion factor, and the analysis results are exactly the same as the experimental hypotheses, that is, there are still strong connections among each variable, and the authenticity and interactivity have the same positive impact on happiness as the immersion factor.

B. The second path:

Authenticity—Para-social interaction—Loneliness—Happiness.

OUTCOME VARIABLE:

Para_social_avg

Table 10. The model summary of regression analysis among authenticity and degree of para-social interaction

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.7457	0.5560	0.5785	356.9345	1.0000	285.0000	0.0000

Table 11. The model of regression analysis among authenticity and degree of para-social interaction

Model						
	coeff	se	t	p	LLCI	ULCI
constant	1.8468	0.1852	9.9747	0.0000	1.4824	2.2113
Authenticity_1	0.8581	0.0454	18.8927	0.0000	0.7687	0.9475

As the data shown in Table 10 and Table 11, by using the same analytical method as the first path, it is presented that the authenticity can positively influence para-social interaction.

OUTCOME VARIABLE:

Loneliness_avg

Table 12. The model summary of regression analysis among authenticity, degree of para-social interaction and loneliness

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.7259	0.5270	0.4434	158.2033	2.0000	284.0000	0.0000

Table 13. The model of regression analysis among authenticity, degree of para-social interaction and loneliness

Model						
	coeff	se	t	p	LLCI	ULCI
constant	0.2823	0.1883	1.4991	0.1349	-0.0883	0.6528
Authenticity_1	0.0975	0.0597	1.6330	0.1036	-0.0200	0.2149
Para-social_avg	0.5489	0.0519	10.5845	0.0000	0.4468	0.6510

In Table 12 and Table 13, the para-social interaction still works the same as the first path. However, the data also demonstrate that the effect of authenticity on loneliness is relatively not as strong as the immersion on it ($B = 0.0975$, $SE = 0.0597$, $t = 1.6330$, $p = 0.1036$).

OUTCOME VARIABLE:

Happiness_avg

Table 14. The model summary of regression analysis among authenticity, degree of para-social interaction, loneliness and happiness

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.8781	0.7711	0.1685	317.8019	3.0000	283.0000	0.0000

Table 15. The model of regression analysis among authenticity, degree of para-social interaction, loneliness and happiness

	Model					
	coeff	se	t	p	LLCI	ULCI
constant	0.4655	0.1165	3.9950	0.0001	0.2362	0.6949
Authenticity_1	0.0798	0.0370	2.1596	0.0316	0.0071	0.1526
Para-social_avg	0.2210	0.0378	5.8528	0.0000	0.1466	0.2953
Loneliness_avg	0.5070	0.0366	13.8593	0.0000	0.4350	0.5790

The data in Table 14 and Table 15, still indicate that all three predictor variables are highly related to happiness, with 77.11% of variance in happiness.

Table 16. Direct effects of authenticity on happiness

Direct effect of X on Y					
Effect	se	t	p	LLCI	ULCI
0.0798	0.0370	2.1596	0.0316	0.0071	0.1526

Table 17. Indirect effects of authenticity on happiness

Indirect effect(s) of X on Y				
	Effect	BootSE	BootLLCI	BootULCI
TOTAL	0.4778	0.0440	0.3953	0.5673
Ind1	0.1896	0.0407	0.1147	0.2766
Ind2	0.0494	0.0277	-0.0053	0.1042
Ind3	0.2388	0.0330	0.1810	0.3129

Table 18. Indirect effect key of authenticity on happiness

Indirect effect key				
Ind1 Authenticity_1	->	Para-social_avg	->	Happiness_avg
Ind2 Authenticity_1	->	Loneliness_avg	->	Happiness_avg
Ind3 Authenticity_1	->	Para-social_avg	->	Loneliness_avg
			->	Happiness_avg

Table 16-18 show the data on the direct and indirect effects of authenticity on happiness. The result is that the authenticity has a positive direct effect on happiness and also positive effects on happiness in all three indirect pathways shown in the Indirect effect key.

C. The last path of the research:

Interactivity—Para-social interaction—Loneliness—Happiness

OUTCOME VARIABLE:

Para-social_avg

Table 19. The model Summary of regression analysis among interactivity and degree of para-social interaction

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.7221	0.5214	0.6236	310.5026	1.0000	285.0000	0.0000

Table 20. The model of regression analysis among interactivity and degree of para-social interaction

Model						
	coeff	se	t	p	LLCI	ULCI
constant	1.9052	0.1949	9.7738	0.0000	1.5215	2.2889
Interactivity 1	0.8331	0.0473	17.6211	0.0000	0.7400	0.9261

In Table 19 and Table 20, the third affordances' data emerges. Still showing that the interactivity can highly influence the degree of para-social interaction positively.

OUTCOME VARIABLE:

Loneliness_avg

Table 21. The model summary of regression analysis among interactivity, degree of para-social interaction and loneliness

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.7245	0.5248	0.4454	156.8476	2.0000	284.0000	0.0000

Table 22. The model of regression analysis among interactivity, degree of para-social interaction and loneliness

Model						
	coeff	se	t	p	LLCI	ULCI
constant	0.2878	0.1904	1.5118	0.1317	-0.0869	0.6625
Interactivity_1	0.0676	0.0578	1.1713	0.2425	-0.0460	0.1813
Para-social_avg	0.5697	0.0501	11.3802	0.0000	0.4712	0.6682

Samely, Table 21 and Table 22 still reflect that para-social interaction has a high and negative effect on loneliness. However, indicates that the interactivity has a relatively small effect on loneliness compared to the other two affordances above.

OUTCOME VARIABLE:

Happiness_avg

Table 23. The model summary of regression analysis among interactivity, degree of para-social interaction, loneliness and happiness

Model Summary						
R	R-sq	MSE	F	df1	df2	p
0.8836	0.7808	0.1614	336.0546	3.0000	283.0000	0.0000

Table 24. The model of regression analysis among interactivity, degree of para-social interaction, loneliness and happiness

Model						
	coeff	se	t	p	LLCI	ULCI
constant	0.4059	0.1150	3.5282	0.0005	0.1794	0.6323
Interactivity_1	0.1454	0.0348	4.1718	0.0000	0.0768	0.2140
Para-social_avg	0.1833	0.0364	5.0428	0.0000	0.1118	0.2549
Loneliness_avg	0.5043	0.0357	14.1190	0.0000	0.4340	0.5746

Using the same data analysis method as mentioned above, in Table 23 and Table 24, it is also indicated that all three variables in the table have large effects on happiness.

Table 25. Direct effects of interactivity on happiness

Direct effect of X on Y					
Effect	se	t	p	LLCI	ULCI
0.1454	0.0348	4.1718	0.0000	0.0768	0.2140

Table 26. Indirect effects of interactivity on happiness

	Indirect effect(s) of X on Y			
	Effect	BootSE	BootLLCI	BootULCI
TOTAL	0.4262	0.0446	0.3376	0.5146
Ind1	0.1527	0.0396	0.0802	0.2345
Ind2	0.0341	0.0286	-0.0214	0.0912
Ind3	0.2393	0.0318	0.1810	0.3083

Table 27. Indirect effect key of interactivity on happiness

Indirect effect key				
Ind1 Interactivity_1	->	Para-social_avg	->	Happiness_avg
Ind2 Interactivity_1	->	Loneliness_avg	->	Happiness_avg
Ind3 Interactivity_1	->	Para-social_avg	->	Loneliness_avg
			->	Happiness_avg

The direct and indirect effects of interactivity on happiness are shown in Table 25-27. The data also claims the result: interactivity has a large direct and indirect effect on happiness.

All in all, the research result can be summarized as: all three affordances mentioned in the study have a positive effect on happiness. However, in the process of measurement, Immersion has strong effects on all output variables, including Para-social interaction, Loneliness and Happiness, while Authenticity and Interactivity have smaller effects on Loneliness but almost the same effects as Immersion on the Para-social interaction and Happiness.

5. Conclusion

This research explores whether the design and the affordances of "Bubble" software can make fans feel a sense of happiness when using it. Ultimately, the study finds that research results are totally consistent with the research hypothesis that all three affordances can have a positive effect on the improvement of fans' happiness.

However, this study is not without its limitations. First, the survey was conducted exclusively in mainland China, whereas K-pop fandom is a global phenomenon. As a result, cultural and regional differences may lead to variations in the applicability of these findings across different fan communities worldwide. Second, the use of self-reported survey responses introduces the potential for response bias, as participants may have overanalyzed their answers or responded based on their perceived self-image rather than their actual behavior. In some cases, respondents may not even be consciously aware of these discrepancies in their responses. Future research could expand the scope of this study by examining K-pop fan communities across different countries, regions, and cultural backgrounds. A comparative analysis of fan behavior in diverse socio-cultural contexts would provide deeper insights into the universality and variability of the emotional value-consumption relationship.

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