

DIGITAL CULTURAL HERITAGE EXPERIENCES AND VISITOR RESPONSES: AN EMPIRICAL STUDY OF THE PALACE MUSEUM

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Abstract: Digital technologies are continuously expanding the ways in which museums showcase cultural heritage and engage with the public. However, the relationship between user evaluations of various types of digital experiences and their cognitive, emotional, and behavioral responses still needs further investigation. This study uses the Palace Museum as a case study, analyzing a questionnaire survey of 175 respondents who had visited the Palace Museum and used its digital products. The study first examined six digital experience characteristics: usability, information completeness, visual appeal, sound quality, storytelling, and interactivity. It then further analyzed the correlation between cognitive responses, affective responses, and behavioral intentions. The results showed that all six digital experience evaluations were above the scale midpoint, with information completeness and usability scoring relatively high, while sound quality, storytelling, and interactivity scored relatively low. Significant positive correlations were found between cognitive responses, affective responses, and behavioral intentions, with the strongest correlation between cognitive and affective responses. The study indicates that the user experience of digital cultural heritage can be examined from different levels, including experience characteristics and cognitive, emotional, and behavioral intentions. The findings suggest that digital cultural heritage experiences can be examined in terms of both experiential characteristics and visitors' cognitive, affective, and behavioral responses.

Keywords: Digital cultural heritage; Digital museums; Palace Museum; User experience; Behavioral intention

1 INTRODUCTION

Digital technologies are continuously transforming how museums and cultural heritage institutions present cultural content to the public. Online exhibitions, virtual tours, augmented reality, virtual reality, and interactive digital platforms have expanded access beyond the spatial and temporal constraints of physical venues. As a result, digital heritage research has increasingly shifted from technological implementation toward user experience, cultural understanding, and subsequent engagement [1-2].

The dissemination effectiveness of digital cultural heritage is influenced by various factors, including technological characteristics, content organization, and user experience. Existing research has discussed the digital museum experience from the perspectives of presence, authenticity, satisfaction, cultural identity, continued use, and willingness to recommend [2-3]. These studies increasingly demonstrate that the digital cultural heritage experience encompasses not only users' cognitive evaluations of technology and cultural information but also their emotional attitudes and subsequent behavioral tendencies.

However, existing research largely focuses on VR, virtual tours, or single online museum systems, examining only one type of experience or behavioral outcome. Large real-world museums typically offer online exhibits, virtual tours, interactive platforms, and other digital services simultaneously. How users comprehensively evaluate these different digital experience characteristics, and the relationship between cognition, emotion, and behavioral intentions within this integrated digital experience, remains worthy of further investigation.

The Palace Museum provides a suitable experiential context for observing this issue. Its digital dissemination encompasses online exhibitions, digital museums, augmented reality, virtual reality, and other interactive cultural products. This study focuses on respondents with experience visiting the Palace Museum and using its digital products, examining their evaluations of the characteristics of their digital experiences, as well as the correlations between cognitive responses, affective responses, and behavioral intentions. The study utilizes cross-sectional questionnaire data, focusing on describing the evaluations across different dimensions and their statistical correlations, providing empirical material from a large comprehensive museum for research on user experience in digital cultural heritage.

2 LITERATURE REVIEW

2.1 Digital Experiences in Cultural Heritage and Museums

The integration of digital technology with tourism and cultural heritage presentation has a long research foundation. Early research has focused on how virtual reality and information and communication technologies have changed the way tourists experience and access information [4-5]. With the development of VR, AR, panoramic displays, and online

museums, the research focus has gradually shifted from technological applications to how users access, understand, and experience digital cultural heritage.

Recent studies have placed greater emphasis on the multidimensional attributes of digital experiences. Li et al. [6], focusing on museum cultural heritage information interfaces, found that different interface designs influence users' exploration methods, aesthetic evaluations, and levels of participation in digital cultural resources, indicating that the effectiveness of digital experiences is closely related to content presentation and interaction design. F. Zheng et al. [7], on the other hand, examined the willingness to continue using digital museums from the perspective of task-technology matching and technology acceptance, pointing out that platform functions, usage contexts, and user experience jointly influence subsequent usage behavior.

Research on the digitization of Chinese cultural heritage has also begun to focus on how digital displays influence visitors' cultural experiences. C. Zheng et al. found that the quality, usability, and interactivity of content in digital cultural heritage displays can affect visitors' imagined experiences and their willingness to travel to the site [8]. These studies indicate that the digital heritage experience encompasses not only technical and functional evaluations but also users' overall perception of cultural information, visual representation, and interactive processes. Therefore, examining the digital cultural heritage experience from multiple dimensions better reflects the actual characteristics of digital dissemination in museums.

2.2 Cognitive, Affective, and Behavioral Responses

Cognition, emotion, and behavior are three common dimensions for understanding user responses. Lavidge and Steiner's hierarchical effects model was among the first to distinguish cognition, emotion, and behavior as different response dimensions, providing a fundamental framework for subsequent research on organizing users' information comprehension, attitude formation, and behavioral tendencies [9]. In the context of digital cultural heritage, this framework helps differentiate users' understanding and evaluation of cultural content, their emotional attitudes, and their willingness to participate.

Cognitive responses typically involve users' understanding and judgment of the value of information, cultural content, and experiences; affective responses include interest, satisfaction, cultural identity, authentic experience, and emotional resonance. The interactive and immersive characteristics of digital media can strengthen the emotional connection between users and cultural content. Wu and Li discussed virtual reality technology from the perspective of empathic communication [10], pointing out that embodied experiences and interactive mechanisms can shorten the psychological distance between users and the media context and enhance emotional resonance. This research provides a supplementary perspective for understanding affective responses in digital cultural heritage, but the scope of affective responses also includes broader psychological experiences such as cultural identity, satisfaction, and value attitudes.

Recent research on digital museums has begun to directly integrate cognition, emotion, and behavior within the same framework. Li et al. [3], based on the Cognition–Emotion–Behavior theory, categorized variables such as perceived usefulness, perceived ease of use, perceived value, and cultural memory into the cognitive level, cultural identity and satisfaction into the emotional level, and continued use and recommendation intention as behavioral outcomes. Their findings revealed multiple significant associations between cognitive factors, affective responses, and behavioral intentions. This research further demonstrates that the Cognition–Emotion–Behavior framework can organize different user responses in digital museums into distinct analytical levels.

Behavioral responses in digital cultural heritage research are mainly manifested in intentions such as continued use, recommendation, information search, and on-site visits. He and Qin [11], in their study of the metaverse of cultural heritage, found a significant link between online digital experiences and offline experience intentions, further demonstrating that digital cultural heritage research is extending from platform acceptance to broader cultural participation behaviors. Therefore, behavioral intentions can serve as an important dimension for observing the subsequent dissemination outcomes of digital experiences.

2.3 Research Gap and Research Questions

Existing research has broadly established two related paths: one focuses on digital technology, interface, and experience quality, while the other focuses on cognitive, emotional, and subsequent behavioral responses. Many studies have focused on VR, virtual tours, or specific online museum systems, while the actual digital dissemination of large museums typically involves multiple digital services. Meanwhile, different studies vary in their operationalization of cognitive, emotional, and behavioral responses. Therefore, examining users' evaluations of different experience characteristics within various digital cultural heritage experience contexts, and the relationships between cognitive, emotional, and behavioral intentions, could provide further empirical data for existing research.

Based on the above literature, this study proposes the following two research questions:

RQ1: How do visitors evaluate different dimensions of the Palace Museum's digital heritage experience?

RQ2: How are visitors' cognitive, affective, and behavioral responses associated in the context of digital heritage experiences?

3 METHODS

3.1 Research Context and Data Collection

This study takes the digital cultural heritage experience at the Palace Museum as its research context. The Palace Museum offers a variety of digital communication formats, including online exhibitions, digital museums, augmented reality, virtual reality, and other interactive digital products. These formats provide audiences with cultural experiences different from physical visits, forming a comprehensive digital experience environment that encompasses information acquisition, visual experience, interactive participation, and cultural understanding.

This study used a questionnaire survey method to collect data. The questionnaires were distributed from May 5th to May 20th, 2024, primarily targeting respondents who had visited the Palace Museum and had used its digital communication products. Researchers contacted users who had posted content about their Palace Museum visits through social media platforms such as Xiaohongshu and Douyin, and also distributed questionnaires in relevant groups on WeChat, Weibo, and Xiaohongshu. This recruitment method was convenient and based on voluntary participation from the target population, and the sample exhibited a certain degree of self-selection.

A total of 195 questionnaires were collected. During data cleaning, samples with too short a completion time, contradictory answers, or those who had never visited the Palace Museum or experienced its digital communication products were excluded, resulting in 175 valid questionnaires, with a valid response rate of 89.7%. Subsequent statistical analysis was performed using SPSS.

3.2 Measures

The questionnaire consisted of four parts: basic information of respondents, methods of experiencing the Palace Museum's digital products, evaluation of the digital experience, and audience reaction after digital dissemination. All measurements related to the experience and dissemination results were based on respondents' existing experience using Palace Museum digital products.

3.2.1 Digital heritage experience

The evaluation of the digital heritage experience includes six aspects: usability, information completeness, visual appeal, sound quality, storytelling, and interactivity. Each item is measured using a 5-point scale, with ratings ranging from 1 (very dissatisfied) to 5 (very satisfied). These items describe respondents' evaluations of different experiential features of the Palace Museum's digital products.

To address RQ1, this study reports the mean and standard deviation of each of the six items, to present a relative evaluation of different digital experience characteristics. Since the focus of this study is not to construct a unified comprehensive score for "digital heritage experience," subsequent analyses will not combine the six items into a single variable.

3.2.2 Cognitive response

Cognitive responses primarily examine the relationship between digital experiences and respondents' understanding of cultural information related to the Palace Museum. The relevant items cover three aspects: Palace Museum artifacts, history, and architectural culture. For example, does digital dissemination help respondents learn about Palace Museum artifacts, understand its history, and deepen their understanding of its architectural culture? All items used a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

3.2.3 Affective response

Affective response measures respondents' emotional and value attitudes formed during their digital experiences. The original questionnaire covered sense of experiences, emotional connections with historical figures or scenes, evaluations of the cultural value of the Forbidden City, and cultural identity and national pride. This dimension also used a 5-point Likert scale.

Since these items cover a broader scope than the narrow definition of empathy, this study uses "affective response" as the overall concept in the English version, while regarding empathy as one specific emotional expression.

3.2.4 Behavioral intention

Behavioral intentions were used to measure respondents' tendency to continue engaging with related cultural content after completing a digital experience. The original questionnaire mainly included three aspects: recommending Palace Museum digital products to others, actively searching for and learning about related digital content, and continuing to participate when the Palace Museum provides more digital content. All items used a 5-point Likert scale.

This dimension uses "behavioral intention" instead of "actual behavior" in the English version because the questionnaire measures the respondent's behavioral tendencies, not subsequent behaviors that have already occurred.

3.3 Reliability and Data Analysis

The original study conducted an internal consistency test on the three multi-item variables of cognitive response, affective response, and behavioral intention. Cronbach's α were 0.892, 0.915, and 0.846, respectively, all showing high internal consistency. The KMO value for all Likert scale items was 0.974, and Bartlett's test of sphericity reached statistical significance, indicating that the correlation structure among the items is suitable for factor analysis.

Data analysis is divided into three parts. The evaluation of digital heritage experience is first described using mean and standard deviation to compare experiential features such as usability, information richness, visual presentation, sound, narrative, and interaction. Cognitive response, affective response, and behavioral intention are also presented using descriptive statistics to show their overall distribution.

To answer RQ2, this study used Pearson correlation analysis to examine the associations among cognitive responses, affective responses, and behavioral intentions. Because the study employed a cross-sectional questionnaire design, the

correlation analysis was used to describe the statistical associations between different dimensions of audience responses, and not to establish temporal order or causal relationships.

4 RESULTS

4.1 Sample Characteristics

This study ultimately obtained 175 valid questionnaires. Of the sample, 114 were female (65.1%), 60 were male (34.3%), and one respondent chose another gender category. The majority of respondents (119, 68.0%) were between 20 and 40 years old. In terms of education level, the largest group (94, 53.7%) had a bachelor's degree, followed by those with an associate's degree (58, 33.1%). The sample covered different city tiers, with a higher proportion of respondents from first-tier, new first-tier, and second- and third-tier cities. Regarding the frequency of digital experiences, respondents primarily fell into two categories: "occasional experiences" and "frequent experiences" (Table 1).

Table 1 Sample Characteristics

Variable	Category	n	%
Gender	Male	60	34.3
	Female	114	65.1
	Other	1	0.6
Age	≤20	11	6.3
	20–40	119	68.0
	41–60	24	13.7
	≥61	21	12.0
Education	High school or below	3	1.7
	College diploma	58	33.1
	Bachelor's degree	94	53.7
	Postgraduate or above	20	11.4

4.2 Evaluation of Digital Heritage Experience

Respondents' overall ratings for the six dimensions of the Palace Museum's digital cultural heritage experience were all above the midpoint of the scale, 3.0, with mean scores ranging from 3.38 to 3.53. Information completeness received the highest rating ($M=3.53$, $SD=1.338$), followed by usability ($M=3.50$, $SD=1.347$) and visual appeal ($M=3.46$, $SD=1.429$). Interactivity and storytelling had mean scores of 3.45 and 3.43 respectively, while sound quality received the lowest score ($M=3.38$, $SD=1.333$).

These results indicate that respondents rated the information content and basic operational experience of the Palace Museum's digital products relatively highly, while rating the sound effects, narrative, and interactive experience relatively low. The mean differences between the different dimensions were generally small; therefore, these results are only used to describe the relative evaluations of each experience feature and not to determine whether there are statistically significant differences between the dimensions (Table 2).

Table 2 Evaluation of Digital Heritage Experience Dimensions

Dimension	M	SD
Information richness	3.53	1.338
Ease of use	3.50	1.347
Visual attractiveness	3.46	1.429
Interactivity	3.45	1.409
Storytelling	3.43	1.362
Audio quality	3.38	1.333

4.3 Cognitive, Affective, and Behavioral Responses

The average scores for all three audience response dimensions were above 3.0. Cognitive response scored the highest ($M=3.59$, $SD=1.277$), followed by affective response ($M=3.53$, $SD=1.225$), while behavioral intention scored relatively low ($M=3.38$, $SD=1.218$).

Looking at the specific items, in the cognitive dimension, the highest score was for "Digital dissemination helps improve understanding of the history of the Palace Museum" ($M=3.67$), indicating that respondents highly valued the historical information function of digital content. In the affective dimension, the mean scores for all items ranged from 3.48 to 3.56, with items that evoked a sense of presence and emotional connection to historical scenes scoring slightly higher. Regarding behavioral intentions, the highest score was for "If the Palace Museum provides more digital content, I will actively participate" ($M=3.43$), while the mean score for actively searching for information on digital dissemination products was relatively low ($M=3.34$) (Table 3).

Table 3 Cognitive, Affective, and Behavioral Responses

Response dimension	M	SD
Cognitive response	3.59	1.277
Affective response	3.53	1.225
Behavioral intention	3.38	1.218

Overall, the average scores for all three dimensions were slightly higher than the midpoint of the scale, with cognitive and affective responses exceeding behavioral intentions.

4.4 Relationships among Cognitive, Affective, and Behavioral Responses

Pearson correlation analysis showed significant positive correlations among cognitive responses, affective responses, and behavioral intentions. The correlation coefficients between cognitive responses and affective responses were $r = .892$, $p < .001$; between affective responses and behavioral intentions were $r = .867$, $p < .001$; and between cognitive responses and behavioral intentions were $r = .851$, $p < .001$.

These results indicate that respondents with higher cognitive appraisals typically also exhibited more positive affective responses and behavioral intentions, and there was a strong correlation between affective responses and behavioral intentions. Given the high correlation coefficients among the three variables, the results are more appropriately interpreted as indicating a close statistical association between the three dimensions of audience response (Table 4).

Table 4 Correlations among Cognitive, Affective, and Behavioral Responses

Variable	1	2	3
1. Cognitive response	—		
2. Affective response	.892***	—	
3. Behavioral intention	.851***	.867***	—

Note: N = 175. *** $p < .001$.

5 DISCUSSION

5.1 Evaluation of the Palace Museum's Digital Heritage Experience

This study first examined respondents' evaluations of different dimensions of their experience with the Palace Museum's digital cultural heritage. Overall, information completeness, usability, and visual appeal received relatively high ratings, while interactivity, storytelling, and sound quality received slightly lower ratings. The differences between the means of each dimension were small, so these results are more suitable for presenting the relative structure of user evaluations than for judging significant differences between different experience dimensions.

This finding aligns with the emerging multidimensional experience perspective in digital heritage research. Existing studies have indicated that the digital museum experience involves multiple aspects, including technological usability, information quality, visual presentation, interaction methods, and content organization [8]. Chekembayeva and Garaus [12] also found that visual appeal and narrative quality are closely related to users' evaluations of virtual museum experiences. Therefore, the digital cultural heritage experience can be understood as a usage context jointly constituted by technological conditions and cultural content. Users are concerned not only with the ease of use of the platform but also with the sufficiency of cultural information, the attractiveness of the content, and whether the experience can maintain sustained engagement.

The Palace Museum's digital experience received relatively high praise for its comprehensive information, indicating that cultural information remains a crucial foundation for users' evaluation of digital cultural heritage products. The digitization of cultural heritage possesses significant information dissemination and educational functions; digital platforms can expand the interpretive space of physical exhibitions through images, text, and multimedia content. Zheng et al.'s research on digital cultural heritage displays also emphasizes the role of content quality in digital experiences [8]. For museums, rich digital functions can only form a complete cultural experience when combined with interpretive cultural content.

In contrast, storytelling, interactivity, and sound effects received slightly lower ratings. This result suggests that information presentation received higher scores from respondents compared to storytelling, interactivity, and sound effects, while the latter still have room for improvement. Related research has identified narrative, authenticity, interactivity, and immersive experience as important factors influencing the user experience of digital museums [2, 12]. For digital cultural heritage products, the value of these experiential features lies primarily in helping users organize fragmented information into a culturally meaningful experiential process, rather than simply adding technological functionality.

5.2 Relationships among Cognitive, Affective, and Behavioral Responses

The second key finding of this study is a strong positive association between cognitive response, affective response, and behavioral intention. Respondents with higher cognitive responses typically also reported more positive affective responses and behavioral intentions, and there was also a close link between affective responses and subsequent willingness to participate.

This finding aligns with the emerging Cognition–Emotion–Behavior perspective in digital museum research. Li et al. [3] linked cognitive factors such as perceived value, cultural memory, and technological evaluation with cultural identity, satisfaction, and recommendation intention, pointing out a multi-layered correlation between cognitive evaluation, emotions, and subsequent behavior in digital museums. Deng et al. [1] also found that perceived value, cultural identity, and on-site visit intention in digital museum experiences are correlated. These studies suggest that users' understanding and evaluation of cultural content and digital experiences can occur simultaneously with their emotional attitudes and subsequent engagement tendencies.

The cognitive responses in this study primarily involve respondents' understanding of the Palace Museum's artifacts, history, and architectural culture, while the affective responses encompass on-site experience, cultural value evaluation, and cultural identity. This measurement structure gives the affective dimension of this study a relatively broad meaning. It includes both the emotions and sense of presence generated during the experience and the user's attitude towards the formation of cultural values. Wu and Li [10], when discussing virtual reality experiences from the perspective of empathic communication, pointed out that embodied participation and media context can strengthen the emotional connection between users and cultural objects. This perspective can explain some of the content in the affective dimension of this study, but cultural identity and value evaluation also involve a broader process of attitude formation. Therefore, using "affective response" as a holistic concept better covers the content actually measured in this study.

The measurement of behavioral intentions primarily involves recommendations, proactive searches, and continued engagement with digital content. These indicators reflect the tendency for sustained cultural contact after the digital experience ends, rather than actual behavior already occurring. Existing research on digital museums also widely employs variables such as continuity intention, recommendation intention, and visit intention to observe users' subsequent reactions [3, 7]. The results of this study further demonstrate a strong statistical association between cognitive response, affective response, and subsequent engagement tendency in the comprehensive digital cultural heritage experience.

The high correlation coefficients among the three dimensions warrant careful interpretation. Strong correlations may reflect a relatively consistent overall evaluation of users' experiences with digital cultural heritage, or they may be related to some content overlap between the different measurement dimensions. Since the existing data cannot be used for further confirmatory factor analysis or discriminant validity testing, this study does not further determine the relative effects of the two explanations [13]. This limitation needs to be addressed in future studies through more refined scale design and construct testing.

5.3 Theoretical and Practical Implications

From a theoretical perspective, this study demonstrates that the Cognition-Emotion-Behavior perspective can serve as an analytical framework for organizing user responses to digital cultural heritage. Previous research on digital museums has often discussed user experience from single angles such as technology acceptance, presence, authenticity, or continued use. However, the division into cognitive, emotional, and behavioral levels allows for simultaneous observation of users' understanding of cultural content, emotional attitudes, and willingness to engage further. This study uses the integrated experience comprised of various digital products from the Palace Museum as a context, providing further empirical data for this analytical approach.

This study also employs a broad conceptual approach to affective responses in digital cultural heritage. Empathy can explain some of the emotional connections formed between users and historical contexts and cultural objects, but the affective responses measured in this study also involve presence, cultural value evaluation, and cultural identity. Therefore, "affective response" is more suitable as the overall concept in this paper, while empathy is considered as a specific emotional expression. This approach helps to maintain consistency between theoretical concepts and actual measurement content.

From a practical perspective, the research results suggest that digital dissemination in museums needs to simultaneously focus on the quality of cultural information and the organization of user experience. Respondents rated information completeness and ease of use relatively highly, indicating that clear, sufficient, and easily accessible cultural information remains a crucial foundation for the digital heritage experience. Relatively low scores for interactivity, storytelling, and sound experience suggest that digital products can further optimize content organization, interaction methods, and multimedia presentation to enable users to form a more coherent cultural experience while acquiring information.

5.4 Limitations

Several limitations of this study need to be clarified. The study employed a cross-sectional questionnaire survey; therefore, the statistical results primarily reflect associations between variables and cannot establish temporal or causal relationships between cognition, emotion, and behavior. The sample was mainly recruited from social media users and related online groups, exhibiting convenience sampling and self-selection characteristics; therefore, the applicability of the research results to other museum user groups needs to be carefully considered.

The scale design also has certain limitations. The cognitive, affective, and behavioral dimensions show a high correlation, but existing materials cannot further verify discriminant validity or more complex measurement models. The affective dimension includes aspects such as presence, emotional resonance, cultural value evaluation, and cultural identity, resulting in a relatively broad construct. Future research could utilize more sophisticated and discriminative scales to

further differentiate between various psychological responses such as presence, empathy, cultural identity, and satisfaction.

Furthermore, this study examined various Palace Museum digital products as part of the overall digital cultural heritage experience, without comparing the specific effects of VR, AR, online exhibitions, and other digital products separately. Future research could compare different digital media formats and, combined with longitudinal surveys, actual usage records, or experimental methods, further observe the relationships between digital experience, cultural understanding, emotional attitudes, and actual cultural participation behaviors.

6 CONCLUSION

This study uses the Palace Museum as a case study to examine user evaluations of digital cultural heritage experiences, and the relationship between cognitive responses, affective responses, and behavioral intentions. The results show that respondents generally gave a positive evaluation of the Palace Museum's digital experience, with information completeness, ease of use, and visual appeal receiving relatively high scores, while interactivity, storytelling, and sound quality received slightly lower ratings. This indicates that the full presentation of cultural information and a low barrier to entry remain crucial foundations for digital heritage experiences. Furthermore, narrative, interactivity, and sound design also constitute important components of the user experience.

At the audience response level, a significant positive correlation was observed among cognitive response, affective response, and behavioral intention. This result echoes the Cognition–Emotion–Behavior perspective in existing digital museum research and further illustrates that various types of digital cultural heritage experiences can be comprehensively observed from three levels: cognitive understanding, emotional attitude, and subsequent participation tendency. For digital museum communication, users' understanding and evaluation of cultural content, their emotional attitudes towards cultural objects, and their willingness to continue searching for, recommending, and participating in digital content constitute an interconnected audience response structure.

This study uses various digital products from the Palace Museum as the research context, examining user responses from three levels: digital experience evaluation and cognitive, emotional, and behavioral intentions. It provides empirical data for understanding the experience of integrated digital cultural heritage. Due to limitations in cross-sectional questionnaire design, convenient recruitment methods, and the high correlation between existing measurement constructs, the conclusions of this paper primarily describe the associations between variables. Future research could employ more rigorous sampling and measurement tools, combined with longitudinal or experimental designs, to further investigate the relationship between different digital media experiences and user cultural engagement.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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