Note

Emotionally engaging digital encounters with dolphins:
Neural insights into wellbeing tourism and regional revitalization

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Abstract
This study investigates how emotionally engaging digital dolphin experiences may contribute to psychological wellbeing and tourism-related motivation. A digital dolphin observation application was developed in collaboration with the Echizen Matsushima Aquarium in Fukui Prefecture, Japan. The system integrates immersive dolphin video presentation, AI-based dolphin activity visualization, caretaker commentary, and interactive feedback functions designed to stimulate relaxation, curiosity, and emotional engagement. To examine the psychophysiological effects of the experience, this study employed a multimodal exploratory framework combining EEG analysis, subjective questionnaires, and cognitive-response assessment. Because EEG experiments require substantial preparation time and environmental control, the study was conducted as a pilot investigation involving ten participants. Two dolphin video conditions were prepared: a calm floating condition intended to induce relaxation and a dynamic movement condition intended to stimulate attentional engagement and curiosity. Experimental results indicated increased alpha-wave activity during dolphin observation, particularly under the calm floating condition, suggesting a relaxation-related neural response. Subjective evaluations also showed positive emotional reactions, including feelings of relaxation, enjoyment, and increased interest in visiting the aquarium. The findings suggest that emotionally engaging digital dolphin experiences may contribute to psychological restoration while also enhancing tourism-related emotional motivation. This study provides preliminary neurophysiological evidence supporting the potential of digital animal-based experiences within the emerging field of digital wellbeing tourism.

Keywords
wellbeing tourism, digital dolphin experience, EEG, emotional engagement, tourism motivation

1. Introduction

In recent years, wellbeing tourism has attracted increasing attention as travelers seek experiences that support psychological restoration, emotional balance, and overall quality of life. Previous studies have suggested that nature-based tourism experiences contribute not only to relaxation and stress reduction but also to emotional engagement, curiosity, and personal vitality [Alrawadieh, 2025; Clissold et al., 2022]. In particular, emotionally engaging interactions with animals and natural environments are increasingly recognized as important components of tourism experiences that promote mental wellbeing.

At the same time, digital and immersive technologies have expanded opportunities for experiencing nature remotely. Research on virtual and digital tourism experiences has demonstrated that emotionally rich audiovisual environments can enhance subjective wellbeing, fascination, and psychological immersion [McLean et al., 2023; Yu and Cheng, 2025]. Such digital experiences may also stimulate curiosity and increase motivation for real-world visitation by creating emotional connections with destinations and living creatures.

Among various nature-based experiences, dolphins have long attracted attention because of their perceived intelligence, playfulness, and emotional expressiveness. Previous studies have suggested that interactions with dolphins and dolphin-related stimuli may contribute to relaxation and emotional stabilization. However, while subjective evaluations of such experiences have been widely discussed, neurophysiological investigations using EEG remain limited, particularly in the context of digital tourism and wellbeing-oriented experience design.

This study focuses on a digital dolphin observation experience developed in collaboration with the Echizen Matsushima Aquarium in Fukui Prefecture, Japan. The system was designed to provide emotionally engaging dolphin video experiences through audiovisual presentation and interactive functions intended to evoke curiosity, relaxation, and emotional involvement.

To explore the psychological and physiological effects of the experience, this study employed a multimodal evaluation framework integrating EEG analysis, subjective questionnaires, and cognitive-response assessments. Because EEG experiments require substantial preparation time, operational cost, and environmental control, the present study was conducted as an exploratory pilot investigation involving a limited number

of participants (n = 10). To complement the limited sample size and reduce reliance on EEG indicators alone, subjective and cognitive evaluations were additionally incorporated.

The purpose of this study is to investigate whether emotionally engaging digital dolphin experiences can contribute to psychological wellbeing and stimulate interest in local tourism destinations. In particular, this paper examines the relationship between dolphin observation, relaxation-related EEG activity, subjective emotional responses, and tourism-related motivation.

This study contributes to the emerging field of digital wellbeing tourism by providing preliminary neurophysiological and psychological evidence regarding emotionally engaging digital nature experiences. Furthermore, the findings suggest the potential of digital animal-based experiences as accessible and inclusive approaches to promoting emotional wellbeing and tourism engagement.

2. Literature review

2.1 Wellbeing tourism and psychological restoration

The concept of wellbeing tourism has evolved from traditional health tourism toward a holistic approach encompassing mental, emotional, social, and spiritual dimensions of human experience. Recent research emphasizes that travel experiences promoting psychological restoration, meaning, and emotional balance contribute not only to personal happiness but also to sustainable destination management [Alrawadieh, 2025; Garzón Vásquez, 2025].

Wellbeing tourism integrates hedonic pleasure—derived from comfort and relaxation—with eudaimonic wellbeing—associated with personal growth and self-realization [Uysal, 2025]. It thus plays a dual role: restoring individuals from everyday stress while enabling them to re-engage with life and community through renewed vitality. Empirical studies have shown that wellbeing tourism positively influences visitors' life satisfaction, mental health, and social connectedness, while also enhancing residents' perceptions of tourism benefits [Garzón Vásquez, 2025].

These findings underscore that wellbeing tourism can be a vehicle for collective wellbeing, connecting individual experiences with community development.

2.2 Digital nature experience and emotional engagement

With the increasing use of immersive technologies, digital tourism experiences are emerging as powerful tools to stimulate emotional engagement and curiosity. McLean, AlYahya, and Osei-Frimpong [McLean et al., 2023] demonstrated that virtual reality tourism enhances subjective wellbeing through feelings of presence, engagement, and fascination. Similarly, Chang and Yang [Chang and Yang, 2024] found that VR experiences induce flow states and alleviate emotional fatigue among long-term care residents, revealing the therapeutic potential of digital media. Yu and Cheng [2025] argue that multimodal tourism experiences—involving synchronized audio, visual, and affective stimuli—can deepen cognitive and emotional immersion, transforming digital interactions into memorable and restorative experiences. Such emotionally rich digital encounters can act as "curiosity triggers," inspiring individuals to seek physical experiences that extend the emotions felt in virtual settings.

In this sense, digital wellbeing experiences not only provide psychological benefits but also serve as gateways to on-site visitation and engagement with real destinations—a key mechanism in the present study.

2.3 Dolphin interaction, biophilia, and relaxation

Dolphins have long attracted human interest because of their perceived intelligence, playfulness, and emotional expressiveness. Previous studies suggest that interaction with dolphins and dolphin-related experiences may promote relaxation, emotional comfort, and positive affective states.

From the perspective of biophilia theory, humans possess an innate tendency to emotionally connect with living organisms and natural environments. Emotionally engaging encounters with animals are therefore considered capable of inducing fascination, empathy, and psychological restoration. In tourism and wellbeing contexts, dolphin observation experiences may provide a unique combination of calmness and curiosity. Unlike passive visual relaxation stimuli, dolphins exhibit dynamic movement patterns and socially expressive behaviors that can sustain attentional engagement while simultaneously promoting emotional comfort.

The present study focuses on digitally mediated dolphin observation experiences designed to evoke emotional involvement through audiovisual immersion and interactive system functions. In particular, the application integrates live dolphin video presentation, AI-based dolphin activity visualization, caretaker commentary, and interactive feedback functions to stimulate curiosity and emotional engagement. These characteristics suggest that digital dolphin experiences may function not only as entertainment content but also as emotionally restorative experiences capable of contributing to psychological wellbeing and tourism-related motivation.

2.4 EEG-based evaluation of emotional wellbeing

Electroencephalography (EEG) has been widely used to evaluate emotional and cognitive states associated with relaxation, attention, and mental restoration. Among EEG frequency bands, alpha-wave activity (8-13 Hz) is commonly associated with relaxed wakefulness, emotional stability, and reduced psychological stress. Increased alpha activity has frequently been interpreted as an indicator of calm but attentive mental states.

Previous studies have demonstrated that emotionally positive audiovisual stimuli and nature-related experiences can induce alpha-wave enhancement. Animal-related interactions have also been associated with physiological relaxation responses and emotional stabilization.

Compared with subjective questionnaires alone, EEG pro-

vides an objective physiological approach for evaluating emotional wellbeing. In tourism and digital experience research, EEG-based assessment enables researchers to examine subtle psychophysiological responses that may not be fully captured through self-report evaluation. However, neurophysiological investigations of digitally mediated dolphin experiences remain limited. In particular, few studies have examined how emotionally engaging digital animal experiences influence both relaxation-related neural activity and tourism-related emotional responses. Accordingly, the present study employs EEG analysis together with subjective and cognitive evaluations as part of a multimodal exploratory framework.

2.5 Research gap and study positioning

Although previous studies have independently examined wellbeing tourism, digital tourism experiences, and nature-based emotional restoration, few studies have integrated digital dolphin experiences, EEG-based physiological evaluation, and tourism-related emotional motivation within a unified framework. Furthermore, most previous tourism wellbeing studies have relied primarily on subjective questionnaires, while objective neurophysiological approaches remain relatively underexplored in digital tourism contexts.

The present study addresses this gap through an exploratory pilot investigation integrating:

- emotionally engaging digital dolphin observation,
- EEG-based relaxation assessment,
- subjective emotional evaluation,
- and tourism-related motivational analysis.

Rather than attempting large-scale behavioral prediction, this study aims to provide preliminary psychophysiological evidence regarding how emotionally engaging digital animal experiences may contribute to wellbeing-oriented tourism design. The study therefore positions digital dolphin observation as a multimodal emotional experience capable of connecting psychological restoration, curiosity, and tourism-related interest within the emerging field of digital wellbeing tourism.

3. Conceptual framework and hypotheses

3.1 Overview

Based on previous studies on wellbeing tourism, digital nature experiences, and emotional engagement, this study proposes a conceptual framework explaining how digitally mediated dolphin observation experiences may contribute to psychological wellbeing and tourism-related motivation.

In recent tourism research, emotionally engaging digital experiences have been recognized as important mechanisms for enhancing subjective wellbeing, curiosity, and destination interest [McLean et al., 2023; Yu and Cheng, 2025]. In particular, animal-related and nature-based experiences are known to induce emotional comfort, fascination, and restorative psychological states [Clissold et al., 2022].

The present study focuses on dolphin observation experiences delivered through an interactive digital system developed in collaboration with the Echizen Matsushima Aquarium in Fukui Prefecture, Japan. The system was designed not only to provide visual dolphin content but also to enhance emotional engagement through multimodal interaction elements, including AI-based dolphin activity visualization, caretaker commentary, and interactive feedback functions. Figure 1 shows the user interface of the developed digital dolphin observation system.

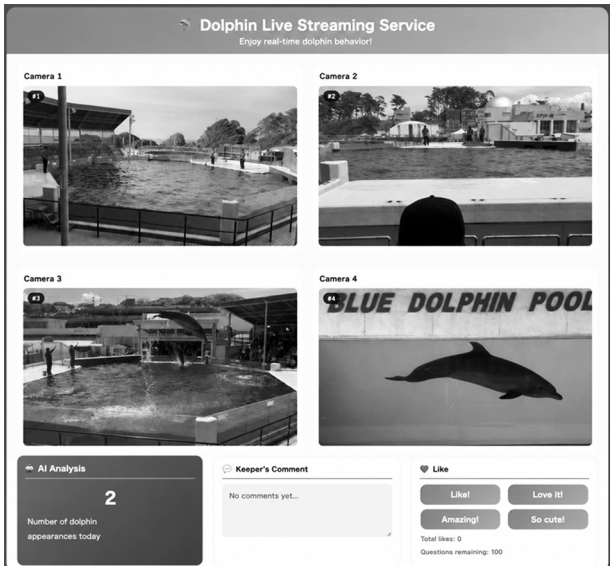

Figure 1: User interface of the digital dolphin observation system

3.2 Operational definitions

To clarify the theoretical constructs used in this study, the following operational definitions were adopted.

- Curiosity:
  Instead of a stable personality trait, curiosity in this study refers to emotionally driven interest and exploratory motivation elicited by dolphin observation experiences. Curiosity was considered to emerge through emotionally engaging audiovisual stimuli and interactive system functions.
- Psychological Wellbeing:
  Psychological wellbeing in this study refers to subjective feelings of relaxation, emotional comfort, and mental restoration. These states were assessed through EEG alpha-wave activity and post-experience questionnaire responses.
- Tourism Motivation:
  Tourism motivation refers to participants' increased interest in or intention to visit the aquarium after the digital dolphin experience. This concept was evaluated through subjective questionnaire responses and participant comments.

3.3 Conceptual framework

Based on these definitions, this study assumes that emotion-

ally engaging dolphin observation experiences stimulate curiosity and emotional involvement, which subsequently contribute to psychological wellbeing and tourism-related motivation. The proposed framework consists of the following process:

- Digital dolphin observation induces emotional engagement and curiosity.
- Emotional engagement contributes to relaxation and psychological wellbeing.
- Positive emotional experiences increase interest in dolphins and the aquarium environment.
- These experiences may stimulate tourism motivation and interest in visiting the destination.

Unlike large-scale tourism behavior studies, the present research aims to provide exploratory evidence regarding psychophysiological and emotional responses associated with digital dolphin experiences.

3.4 Multimodal evaluation framework

To investigate these relationships, this study employed a multimodal evaluation framework integrating neurophysiological, psychological, and behavioral perspectives. The evaluation framework consisted of:

- EEG-based physiological assessment
- Subjective questionnaire evaluation
- Cognitive and emotional response assessment

EEG analysis was conducted to examine relaxation-related alpha-wave activity during dolphin video observation. Subjective questionnaires were used to assess emotional comfort, relaxation, curiosity, and tourism-related interest after the experience. Because EEG experiments require substantial preparation time, operational cost, and environmental control, the study was conducted as an exploratory pilot investigation involving a limited number of participants (n = 10). To complement the limited sample size and reduce reliance on EEG indicators alone, subjective and cognitive evaluations were additionally incorporated.

3.5 Research positioning

This study positions digital dolphin observation not merely as entertainment content but as an emotionally engaging digital nature experience with potential applications in wellbeing tourism and emotionally supportive tourism design. The study contributes to the emerging field of digital wellbeing tourism by integrating:

- emotionally engaging animal-based interaction,
- neurophysiological relaxation assessment,
- and tourism-related motivational evaluation

within a unified exploratory framework. Furthermore, the research provides preliminary evidence regarding how digital animal experiences may function as accessible and inclusive wellbeing-oriented tourism experiences.

4. Development and evaluation of the application

4.1 Concept and objectives

This study developed a digital dolphin-observation application aimed at inducing relaxation, curiosity, and emotional engagement through immersive audiovisual dolphin experiences. The application was designed as part of a wellbeing tourism framework to explore how emotionally engaging digital nature experiences may contribute to psychological restoration and stimulate interest in local tourism destinations, particularly the Echizen Matsushima Aquarium in Fukui Prefecture, Japan.

Previous studies have suggested that interaction with animals, especially dolphins, may promote relaxation and positive emotional states. Building upon these findings, the present system delivers dolphin observation experiences through interactive digital functions intended to evoke emotional comfort and attentional engagement while examining their psychophysiological effects using EEG.

Rather than functioning solely as entertainment content, the system was designed as a digital wellbeing experience integrating emotional design, curiosity stimulation, and tourism-oriented engagement.

4.2 System overview

The developed application consists of four primary components:

- Dolphin Video Presentation Module:
  The system provides real-time or recorded footage of dolphins swimming, floating, and moving dynamically within the aquarium environment. Multiple camera perspectives are incorporated to create immersive and emotionally engaging viewing experiences.
- AI-Based Dolphin Activity Visualization:
  A YOLO-based image recognition system was implemented to detect and count dolphin appearances automatically. The visualization of dolphin activity was intended to stimulate curiosity and attentional engagement.
- Interactive Communication Functions:
  The interface includes caretaker commentary, feedback buttons (e.g., “Like,” “Amazing,” and “So Relaxing”), and replay functions to strengthen emotional involvement and user interaction.
- Relaxation-Oriented Interface Design:
  Soft blue color tones, smooth transitions, and marine-inspired visual composition were employed to support emotional calmness and psychological comfort during dolphin observation.

The application was implemented using Python, OpenCV, and Flask, and synchronized with the BIO-NVX24 EEG sys-

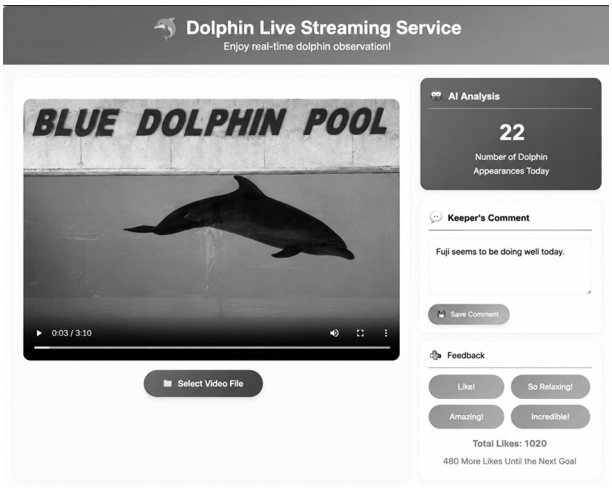

Figure 2: Screenshots of the developed application

tem for physiological data collection. Figure 2 shows screenshots of the developed application.

4.3 Experimental method

- Participants:
  Ten participants (five male and five female; aged 18-22 years) participated in the experiment. All participants had normal or corrected-to-normal vision and reported no neurological disorders or major psychological conditions. Participants were recruited voluntarily from the National Institute of Technology, Fukui College community. This study was approved by the Human Research Ethics Committee of National Institute of Technology, Fukui College. All participants provided informed consent prior to participation.
- Experimental Environment:
  The experiment was conducted in a quiet and dimly lit room to minimize external sensory interference. Participants viewed dolphin videos on a 24-inch monitor positioned approximately 60 cm from the seated participant. EEG signals were recorded using the BIO-NVX24 system with channels Po3, A1, A2, O1, and O2. Continuous EEG measurements were sampled at 500 Hz.
- Experimental Conditions:
  Two dolphin video conditions were prepared:
  Video 1 (Calm Floating Condition): A dolphin floating calmly near the water surface, designed to induce relaxation and emotional calmness.
  Video 2 (Dynamic Movement Condition): A dolphin moving dynamically in and out of the viewing area, designed to stimulate curiosity and attentional engagement.
  The order of video presentation was randomized across participants.

Figure 3 and Figure 4 show examples of the experimental stimuli.

- Experimental Procedure:

Figure 3: Calm floating dolphin condition (Video 1)

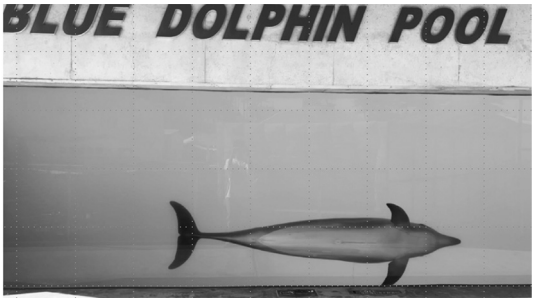

Figure 4: Dynamic movement condition (Video 2)

The experimental procedure consisted of the following steps:

1. Baseline EEG recording for 60 seconds under resting conditions.
2. Viewing of Video 1 or Video 2.
3. Short resting interval between video conditions.
4. Viewing of the second video condition.
5. Post-experiment questionnaire assessment.

After the viewing sessions, participants completed questionnaires regarding:

1. Perceived relaxation,
2. Emotional comfort,
3. Curiosity,
4. Enjoyment,
5. Tourism-related interest

4.4 EEG data analysis

EEG data were processed using Octave with band-pass filtering between 1-30 Hz. Alpha-wave activity (8-13 Hz) was extracted and analyzed as an indicator of relaxation-related neural activity. Baseline correction was performed using the resting-state EEG segment recorded before video presentation. EEG signals containing excessive motion artifacts or noise

were visually inspected and excluded from analysis when necessary. Differences between baseline and post-viewing alpha-wave activity were analyzed using paired *t*-tests with a significance level of $p < 0.05$.

4.5 Experimental results

4.5.1 EEG Analysis

The calm floating dolphin condition (Video 1) produced a clear increase in alpha-wave activity compared with the baseline condition. Average alpha-wave enhancement during Video 1 reached approximately +5 dB, indicating a strong relaxation tendency. In contrast, the dynamic movement condition (Video 2) produced a smaller increase in alpha-wave activity (approximately +1 dB), suggesting mild relaxation combined with attentional engagement and curiosity.

These findings indicate that emotionally engaging dolphin imagery can induce a balanced psychophysiological state characterized by calmness and cognitive engagement.

4.5.2 Subjective evaluation

Questionnaire responses indicated positive emotional reactions among participants.

- 90 % reported feeling relaxed and refreshed.
- 100 % reported enjoying the dolphin observation experience.
- 60 % reported increased motivation to visit the aquarium in person.

Participants who expressed strong affinity toward animals tended to report higher emotional comfort and stronger relaxation experiences.

The subjective evaluations were generally consistent with the EEG findings, suggesting that digital dolphin experiences contribute to both psychological wellbeing and tourism-related emotional motivation.

4.6 Summary

This chapter described the development and evaluation of the digital dolphin observation system and presented preliminary psychophysiological findings obtained through EEG analysis and subjective evaluation. The results suggest that emotionally engaging digital dolphin experiences may contribute to relaxation, curiosity stimulation, and tourism-related emotional engagement. Furthermore, the findings support the multimodal exploratory framework proposed in Chapter 3, connecting emotional engagement, psychological wellbeing, and tourism-related motivation through digital nature experiences.

5. Results and discussion

5.1 Overview of EEG results

The EEG experiment revealed a consistent pattern indicating that the dolphin-observation application induced relaxation-related neural activity.

Across participants, alpha wave power increased significantly during the calm floating dolphin video (Video 1) compared with the baseline condition ($p < 0.05$). The dynamic movement condition (Video 2) produced a smaller but positive increase in alpha amplitude. The increase in alpha activity during dolphin imagery viewing indicates a state of relaxed attention, combining both calmness and cognitive engagement—an ideal profile for psychological wellbeing.

5.2 Relationship between individual traits and physiological responses

Further analysis revealed that participants who self-identified as “fond of animals” exhibited the largest alpha wave increases. Among these individuals, all reported feeling relaxed during the session, and their EEG data confirmed a clear rise in alpha power. In contrast, participants who expressed less affinity toward animals showed smaller or negligible alpha changes. This finding suggests that personal affinity toward animals functions as a moderating factor influencing the psychophysiological relaxation response.

Such an individual difference aligns with prior research emphasizing empathy and biophilia—the innate human tendency to connect emotionally with living beings—as key drivers of wellbeing responses to animal-related stimuli [Clissold et al., 2022; McLean et al., 2023].

5.3 Interpretation of findings

5.3.1 Digital dolphin experience and relaxation

The observed enhancement of alpha activity supports the premise that emotionally engaging digital nature content can induce measurable relaxation, even without direct physical interaction.

The calm floating dolphin condition induced stronger relaxation-related alpha activity, suggesting that gentle and emotionally calming visual stimuli contribute effectively to psychological restoration. In contrast, the dynamic movement condition appeared to stimulate attentional engagement and

Table 1: Changes in alpha wave power during dolphin video viewing

Condition	Mean Alpha Change (dB)	Interpretation
Video 1: Calm Floating Dolphin	+5.2	Strong relaxation tendency
Video 2: Dynamic Dolphin Movement	+1.1	Mild relaxation and attentional engagement
Baseline	0.0	Reference condition

curiosity while maintaining mild relaxation effects.

5.3.2 From individual wellbeing to tourism motivation

In line with the conceptual framework proposed in Chapter 3, these results demonstrate that positive affective experiences derived from digital observation may enhance psychological wellbeing, which can in turn strengthen place attachment and visit intention.

Participants who experienced stronger physiological relaxation also expressed curiosity and interest toward Echizen Matsushima Aquarium, suggesting a psychological pathway from digital wellbeing to local tourism motivation.

5.3.3 Implications for inclusive and regional wellbeing

The findings highlight the potential of digital wellbeing tourism systems to promote emotional restoration and regional engagement. Because such systems can be accessed remotely, they allow individuals with limited mobility or sensory sensitivities to experience therapeutic effects and form emotional connections with destinations. This aligns with inclusive tourism goals and contributes to regional revitalization through emotional accessibility.

5.4 Limitations and future work

Several limitations should be acknowledged:

- Sample Size: The small number of participants (n = 10) limits the generalizability of findings.
- Short-Term Exposure: The immediate relaxation effect was confirmed, but long-term impacts remain unknown.
- Controlled Laboratory Environment: Real-world variability (noise, attention drift, device differences) was not captured.
- Future research should: Increase sample size and include cross-cultural participants.
- Employ additional physiological measures (heart rate variability, skin conductance).
- Conduct field-based studies connecting digital engagement metrics with actual tourism behavior.

5.5 Summary

The results demonstrate that watching dolphin imagery through the developed application elicited clear alpha-wave enhancement, indicating physiological relaxation. Participants with strong affinity toward animals exhibited the most pronounced effects, underscoring the role of emotional and personality factors in digital wellbeing experiences. These findings empirically validate the proposed Digital-to-Local Wellbeing Tourism Model, showing that emotionally restorative digital interactions can nurture both individual wellbeing and community engagement.

6. Conclusion and future directions

6.1 Summary of findings

This study developed and evaluated a digital dolphin observation application designed to promote relaxation, curiosity, and emotional engagement, while exploring its potential to stimulate local tourism and inclusive wellbeing. The results demonstrated that viewing dolphin imagery through the application significantly increased alpha wave activity, indicating a psychophysiological relaxation effect. Moreover, participants who reported a strong affinity for animals exhibited greater alpha enhancement, suggesting that individual empathy and biophilic tendencies amplify the relaxation response.

These outcomes validate the proposed Digital-to-Local Wellbeing Tourism Model, showing that digital experiences can bridge the gap between personal emotional restoration and regional revitalization by motivating users to visit local destinations such as the Echizen Matsushima Aquarium.

6.2 Theoretical implications

The findings contribute to the growing field of wellbeing tourism research by introducing an EEG-based evaluation framework for digital relaxation experiences.

While previous studies have focused on subjective wellbeing indicators, this study integrates objective neurophysiological data to quantify relaxation effects, providing empirical evidence for the psychological mechanisms proposed in tourism wellbeing theory [Alrawadieh, 2025; Clissold et al., 2022]. Furthermore, the inclusion of individual traits—such as affinity toward animals—advances understanding of personalized wellbeing design, aligning with the broader trend toward emotionally adaptive tourism systems.

6.3 Practical implications

From a practical standpoint, the developed system demonstrates how immersive digital content can serve as an entry point to real-world tourism engagement.

Aquariums and other local attractions can utilize similar applications to:

- Offer remote relaxation experiences that attract new visitors;
- Extend engagement beyond physical boundaries through digital storytelling;
- Support inclusive participation, allowing those with disabilities or travel limitations to access marine wellbeing experiences.

By integrating such digital wellbeing tools into regional tourism strategies, destinations can foster sustainable visitor interest and community-wide mental health benefits.

6.4 Limitations and ethical considerations

This study represents an initial attempt to link digital affective design, neurophysiological evaluation, and tourism wellbeing. While the findings are promising, several methodological and ethical considerations should be noted.

First, the sample size was relatively small, and the experimental environment was controlled. Future studies should in-

clude larger participant groups and real-world testing environments to ensure ecological validity.

Second, when applying digital animal imagery in tourism promotion or wellbeing applications, ethical use of animal content must be prioritized. Because videos are represent only a small portion of the animals' daily lives, viewers may misinterpret specific scenes without proper contextual explanation. To prevent misunderstandings or undue criticism of caretakers, creators should provide accurate information about animal care practices and avoid selective or misleading representations. Furthermore, content should not be distributed when animals show signs of illness or stress, in order to respect both animal welfare and the work of caretakers. Collaborative monitoring with aquariums or animal care experts is essential to maintain transparency and ensure that wellbeing content aligns with ethical standards.

Finally, establishing guidelines for digital animal-based tourism—covering consent, welfare, and communication ethics—will be a crucial direction for future research and practice.

6.5 Concluding remarks

This research provides a novel contribution to the intersection of digital wellbeing, affective neuroscience, and tourism management.

By demonstrating that emotionally engaging digital experiences with animals can elicit measurable relaxation and foster connection to local destinations, the study offers a new pathway for sustainable and inclusive regional revitalization. Ultimately, the digital dolphin observation system serves not only as a technological prototype but also as a conceptual bridge—linking mind and place, individual and community, and digital empathy with real-world wellbeing.

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References

Alrawadieh, Z. (2025). *A research agenda for tourism and wellbeing*. Edward Elgar Publishing.

Clissold, R., Westoby, R., and Fleming, C. (2022). Wellbeing outcomes of nature tourism: Mt Barney Lodge. *Annals of Tourism Research Empirical Insights*, Vol. 3, No. 2, 100047.

Damania, P. and Singh, R. (2025). Igniting creativity through travel: The roles of interest, cognition, and emotion. *Tourism Management*, Vol. 98, 104942.

Garzón Vásquez, D. E. (2025). Effects of tourism on well-being from the perspective of key stakeholders. *Humanities & Social Sciences Communications*, Vol. 12, 345.

Hu, H., Chen, Z., and Li, X. (2025). Calling for cross-disciplinary research on tourists with mental disorders. T*ourism Management*, Vol. 99, 104969.

Li, J., Pan, L., and Hu, Y. (2021). Cultural involvement and attitudes toward tourism: Examining serial mediation effects of residents' spiritual wellbeing and place attachment. *Journal of Destination Marketing & Management*, Vol. 20, 100601.

Makuyana, G. and du Plessis, E. (2025). Exploring the obstacles and opportunities related to disability-inclusive diversity management in the local tourism sector of South Africa. *Tourism Management*, Vol. 99, 104965.

McLean, G., AlYahya, M., and Osei-Frimpong, K. (2023). Examining the influence of virtual reality tourism on consumers' subjective wellbeing. *Tourism Management Perspectives*, Vol. 46, 101088.

Sumanapala, D. and Wolf, I. D. (2023). A wellbeing perspective of Indigenous tourism in Sri Lanka. *Annals of Tourism Research Empirical Insights*, Vol. 4, No. 1, 100093.

Yu, C. and Cheng, M. (2025). Multimodality in tourism and hospitality: A critical and narrative review. *Tourism Managemen*t, Vol. 98, 104940.

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