

Basic Study of the Physiological and Psychological Effects of

Museum Bathing (4):

Case Studies of “Appreciation,” “Hands-on Experience,” and “Town Walking”

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Abstract: To investigate the physiological and psychological effects of the practice of “museum bathing” proposed by the author, experiments have been conducted using a variety of test subjects, including junior and senior high school students, curators and museum staff, and university students of museum studies and other university students. Data collected from psychological and physiological measurements indicate that museum bathing has a relaxing effect on all these categories.

In this study, the range of experiments was geographically expanded to include not just Kyushu (Fukuoka, Nagasaki, Kumamoto, and Kagoshima prefectures), but also Shiga, Gifu, and Okinawa prefectures. The test subjects were all local residents (aged 10s to 80s). More activities were added to the method of this verification research to psychologically and physiologically evaluate the relaxing effect of museum bathing: as well as individually viewing historical, archaeological, folk, fine art, and natural history artifacts, the test subjects were also directed to touch them and discuss their reflections in groups, and to stroll through a historical townscape. Evaluations of the psychological and physiological impact of the following three activities indicated that museum bathing had a relaxing effect on the residents at each test locality: (1) viewing artifacts and materials; (2) touching, reflecting on, and discussing artifacts and materials; and (3) walking in historical townscapes. This finding suggests that museum bathing can be confidently advocated as a means of increasing the “healthy life expectancy” of people, through cooperative implementation with local medical and welfare bodies.

Keywords: museum bathing, mental health, physiological measurement, psychological measurement, local community

1. Introduction

The museums in Japan are at a point of major transition.

A partial amendment of the Museum Law¹ taking effect on April 1, 2023 is expected to “address diverse regional and social issues to help promote local revitalization.” Museums are thus required to provide “intellectual stimulation, learning, and enjoyment,” to serve as places of “health,” and to facilitate research aimed at creating new value. In fact, discussions about “museums and health/well-being” within the museum world have been in full swing for several years.²

The author has been conducting a number of fundamental studies on the physiological and psychological effects of “museum bathing” (visiting a museum to access the healing potential of

¹ Agency for Cultural Affairs, “About the Partial Amendment to the Museum Law (Act No. 24 of 2022),” from https://www.bunka.go.jp/seisaku/bijutsukan_hakubutsukan/shinko/kankei_horei/93697301.html

² MuseumNext® MUSEUMS, HEALTH & WELLBEING SUMMIT (held Feb. 6 and 7), <https://www.museumnext.com/events/museums-health-wellbeing-summit/speakers/>

museums for promoting health and preventing disease), publishing a total of five research notes to date.

They are: Research Note (1) Verifying the Relaxing Effect of “Museum Bathing”: Toward a New Role for Museums in a Super-aging Society³; Research Note (2) Prospects for Furthering the Study of Museum Bathing: A Review of the International Research Literature Based on a Scoping Review by Law et al.⁴; Research Note (3) A Basic Study of the Physiological and Psychological Effects of Museum Bathing (1): A Case Study of Junior and Senior High School Students⁵; Research Note (4) A Basic Study of the Physiological and Psychological Effects of Museum Bathing (2): A Case Study of Curators and Museum Staff⁶; and Research Note (5) A Basic Study of the Physiological and Psychological Effects of Museum Bathing (3): A Case Study of University Students Doing Museum Studies and Other University Students.⁷

In Research Note (1), I reported on objective data accumulated by conducting physiological and psychological measurements on local residents and students interested in museums after visiting different types kinds of museums such as history, art, archaeology, and folklore. This study was based on earlier verification experiments in researches on “forest bathing” (*shinrin-yoku*, indicating the act of “immersing oneself in the forest atmosphere,” a term that emerged in Japan in the 1980s).

In Research Note (2), I reported on various verification experiments used in “museum bathing” research around the world, to identify common issues in those to find a unified method of psychological and physiological measurements and verification experiments. In particular, I mentioned that “...with regard to the limitations of studies identified in the various papers (including the evaluation of the sense of well-being brought about by the setting and characteristics of artwork in different types of museum, experiments on the length of time spent viewing artworks, research on individual differences, methods for setting experimental and control groups, and continuous experiments involving the same group in different museum types), it will be necessary to continue to elaborate and refine research methods by conducting a series of field experiments to accumulate scientific data.”

To address this need, in my third study, reported in Research Note (3), I narrowed down the test subjects to junior and senior high school students. To collect objective evaluation data, physiological and psychological measurements were done at the Fukuoka Asian Art Museum, Fukuoka City Museum, Kyushu National Museum, and Fukuoka Art Museum.

In Research Note (4), I reported on another study with another narrowed group of test subjects; curators and museum staff. This time, the physiological and psychological measurements were

³ Izumi Ogata (2021), Kyushu Sangyo University, Journal of Collaborative Regional Development, No. 6, 55-72, http://repository.kyusan-u.ac.jp/dspace/bitstream/11178/8117/1/chiiki%20vol.6_04.pdf

⁴ Izumi Ogata (2021), Kyushu Sangyo University Journal of Collaborative Regional Development, No. 7, 35-52, http://54.64.211.208/dspace/bitstream/11178/8122/1/chiiki%20vol.7_03.pdf

⁵ Izumi Ogata (2022). Kyushu Sangyo University Journal of Collaborative Regional Development, No. 8, 17-49, http://repository.kyusan-u.ac.jp/dspace/bitstream/11178/8220/1/chiiki%20vol.8_02.pdf

⁶ Izumi Ogata (2022), Kyushu Sangyo University Journal of Collaborative Regional Development, No. 9, 27-47, http://repository.kyusan-u.ac.jp/dspace/bitstream/11178/8263/1/chiiki%20vol.9_03.pdf

⁷ Izumi Ogata (2022), Kyushu Sangyo University Journal of Collaborative Regional Development, No. 9, 48-76, http://repository.kyusan-u.ac.jp/dspace/bitstream/11178/8264/1/chiiki%20vol.9_04.pdf

conducted to collect objective evaluation data at Togitsu Folk Museum (Nagasaki Prefecture), Miyake Museum of Art (Kagoshima Prefecture), and Mifune Dinosaur Museum (Kumamoto Prefecture).

In the study reported in Research Note (5), I narrowed the test subjects to two groups of university students—one group studying museology (museum studies), and another group that is not. The physiological and psychological measurements were conducted at the Museum of Kyushu Sangyo University and Iizuka City Historical Museum (Fukuoka Prefecture) to collect objective evaluation data. I concluded that the collected data in Research Note (1), Research Note (3), Research Note (4), and Research Note (5), each indicated that museum bathing had a relaxing effect on the test subjects.

These evaluation experiments were conducted in response to the following six questions raised by Mikaela Law et al.⁸ at the University of Auckland, New Zealand in order to stay consistent with the research methods and experimental procedures involving information sharing and psychological and physiological measurements with researchers tackling museum bathing research in the UK, Italy, Switzerland, the US, and other countries.

- (1) What groups and environments were studied?
- (2) What research methods were used?
- (3) What stress outcomes were measured?
- (4) What types and specific works of art were viewed?
- (5) How long were artworks viewed for, and how many artworks were viewed?
- (6) Were any changes in stress outcomes observed in the study?

Up to now, however, my test subjects (age range 10s to 70s) of junior and senior high school students; museum curators and staff; and university students studying/not studying museology were limited to the Kyushu region, and my experiments only involved the viewing of artworks and materials individually and in groups.

Therefore, for this study, I expanded the geographical area of experiments to include various parts of Kyushu (Fukuoka, Nagasaki, Kumamoto, and Kagoshima Prefectures), as well as Shiga, Gifu, and Okinawa Prefectures. The test subjects were set to all residents of these places (age range 10s to 80s), and the methods used not only involved viewing of historical, archaeological, folk, fine art, and natural history materials, but also touching the materials physically and discussing their reflections in groups (“hands-on experience”), and strolling through historical townscapes (“town walking”). Through these experiments, I aim to psychologically and physiologically evaluate the relaxing effects of museum bathing activities.

Before the commencement of the experiments, all the test subjects who were asked to take part were provided with a detailed explanation of the purpose of the study and given assurances that anonymity and confidentiality would be maintained, that data would be securely managed, and that

⁸ Mikaela Law, Nikita Karulkar, Elizabeth Broadbent (2021), “Evidence for the effects of viewing visual artworks on stress outcomes: a scoping review,” *BMJ Open*

nobody would face any disadvantage as a consequence of not agreeing to participate in the experiment. Willing participants were also asked to consent to the use and publication of the psychological and physiological data obtained from the experiment for future research activities. The experiments were all approved by the Kyushu Sangyo University Ethics Committee on Research Involving Human Subjects (Notice No. 2020-004).

2. Methods and descriptions of museum bathing experiments based on “viewing,” “hands-on experience” and “town walking”

2.1. “Viewing” experiment in the Cultural Exchange Exhibition Hall of Kyushu National Museum (Fukuoka Prefecture)

The experiment at Kyushu National Museum were held twice, on Thursday, January 5 and Friday, January 6.

- (1) **Venue:** Kyushu National Museum⁹ (opened 2005, 4-7-2 Ishizaka, Dazaifu City, Fukuoka Prefecture), is located south of central Fukuoka City, an approximately 10-minute walk from Dazaifu Station on the Nishitetsu Line.
 - (2) **Dates:** Thursday, January 5 and Friday, January 6, 2023 (museum was open on these days)
 - (3) **Test subjects:** 6 junior and senior high school students (4M, 2F) and 12 adults (2M, 10F), 1 aged 50s, 3 aged 40s, 3 aged 30s, and 5 aged 20s on Thursday, January 5; and 14 (S) high school students (2M, 12F) on Friday, January 6.
 - (4) **Meeting and measurement place:** Seminar Rooms A and B (1F)
 - (5) **Method of viewing:** Viewing was conducted in the same place on both days, the Cultural Exchange Exhibition Hall (4F), featuring exhibits from the Paleolithic Age to Edo Period, divided into five themes. Due to time constraints, viewing was limited to Theme 2 “Political Power: Cultivating Rice” (67 pieces in the main exhibition hall and 16 pieces in Room 4), Theme 3 “Nation Building: The Age of the Envoys” (22 pieces in Room 8), and Room 9 “Hatsune *Maki-e* Lacquer Trousseau” (26 pieces). The test subjects moved through these exhibitions for viewing in two groups.
 - (6) **Number and types of works viewed:** 131 pieces from the Yayoi to Edo period
 - (7) **Description of works:** Sets of five pieces selected from a list of works proposed by the Kyushu National Museum
 - Theme 2 “Political Power: Cultivating Rice” (main exhibition hall)
- Main items on exhibition:** Name of piece (place of excavation, quality, shape, period, etc.)
- (i) Plate-style Earthenware Jar (Imagawa Site, Fukuoka Prefecture)
 - (ii) Three-pronged Hoe (Sasai Site, Fukuoka Prefecture).
 - (iii) Large Sue Ware Jar (Okinoshima No.5 site, Fukuoka Prefecture, National Treasure)
 - (iv) Red-polished Ware Jar (Kurita Site, Fukuoka Prefecture, Important Cultural Property)

⁹ Kyushu National Museum website, <https://www.kyuhaku.jp>

(v) Bronze Halberd (Sugu Okamoto Site, Fukuoka Prefecture, National Treasure)

● Theme 2 “Political Power: Cultivating Rice” (Room 4)

Main items on exhibition: Name of piece (place of excavation, quality, shape, period, etc.)

(i) House-shaped *Haniwa* (hollow clay figure) (Sekijinsan burial mound, Fukuoka Prefecture, Japan)

(ii) *Haniwa* of a Farmer (Ishiyama Site, Gunma Prefecture)

(iii) Cylindrical *Haniwa* (Oninomakura burial mound, Fukuoka Prefecture)

(iv) Stone Ornamental Human Figure (Iwatoyama burial mound, Fukuoka Prefecture, Important Art Object)

(v) Stone Coffin (Ishibitsuyama burial mound, Omuta City, Fukuoka Prefecture)

● Theme 3 “Nation Building: The Age of the Envoys” (Room 8)

Main items on exhibition: Name of piece (place of excavation, quality, shape, period, etc.)

(i) Wide-mouth Blown Glass Jar (Sidon, Syria, 1st to 3rd century CE)

(ii) Glass Bowl (Eastern Mediterranean region, 1st to 2nd century CE)

(iii) Bowl with Bird and Animal Design (Northern Iran, 11th to 12th century CE)

(iv) Indigo-glazed Star-shaped Tile with Bird Design (Kashan, Iran, 13th century CE)

(v) Painted Pottery Camel (China, 7th to 8th century CE)

● Theme 4 “Merchants of the Asian Seas” (Room 9)

Main items on exhibition: Name of piece (place of excavation, quality, shape, period, etc.)

(i) Folding Screen with Flowers (6 pieces + 1 pair, paper with gold coloring, Edo period)

(ii) Letters Box, Teeth Blackener Box, Paper Hair Tie Box, Eyebrow-making Box

(iii) Sash Worn under Robes with Design of Chrysanthemum Branches and Cypress Fans

(iv) Hatsune *Maki-e* Lacquered Desk (Edo period, National Treasure)

(v) Butterfly *Maki-e* Lacquered Long Letters Box (Edo period, National Treasure)



Fig. 1 “Viewing” experiment at Kyushu National Museum (January 5, 2023)

(8) **Program for the day** (Fig. 1): Times in brackets apply to Friday Jan. 6

13:30 Start of registration

14:00 Opening ceremony, self-introduction, taking consent for measurements

14:05 Measurement #1 (physiological: blood pressure, pulse; psychological: POMS (short form))

14:20 (14:30) Move to Exhibition Hall

14:25 (14:35) Viewing (individually in Cultural Exchange Exhibition Hall, to find favorite pieces)

14:45 (15:05) Move to measurement place

14:50 (15:10) Measurement #2 (physiological: blood pressure, pulse; psychological: POMS (short form))

15:20 (15:15) Break

15:30 Explanation on museum bathing research

15:45 Short Review in a few words

16:00 Closing ceremony, end, cleanup

(9) **Duration of viewing:** The average time spent by test subjects was 20 minutes on Thursday, January 5 and 30 minutes on Friday, January 6.

(10) **Instructions for viewing:** “Find your favorite piece.”

(11) **Measurement methods:** Physiological (blood pressure, pulse); psychological (POMS, short form)

●Physiological measurement: Each test subject was given an OMRON HEM-6121 Wrist Blood Pressure Monitor to measure their blood pressure and pulse. Two measurements were made each time. The two readings and their average value were recorded.

●Psychological measurement: All the test subjects were asked to fill out a POMS sheet (short form, by Kaneko Shobo) before and after each viewing session.

(12) **Measurement results:** Systolic (max.) blood pressure and diastolic (min.) blood pressure, and pulse all decreased, both after the 20-minute viewing on Thursday, January 5 and the 30-minute viewing on Friday, January 6.

The POMS results showed that for both the viewing sessions on Thursday, January 5 and Friday, January 6, the mean values for all the negative emotions (Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety) decreased. On the other hand, the mean value for the positive emotion of Vigor-Activity decreased slightly on Thursday, January 5 but increased slightly on Friday, January 6. A previous museum bathing experiment was conducted at the Kyushu National Museum on Wednesday, January 5, 2022. A comparison with the data from that experiment along with other details is given in Section 3 of this report.

(13) **Study limitations:** The Cultural Exchange Exhibition Hall on the fourth floor of the Kyushu National Museum is divided into five themes covering a historical timeframe from the Paleolithic Age to Edo Period. Due to time constraints, the time allowed for viewing Theme 2 “Political Power: Cultivating Rice” (67 pieces in the main exhibition hall and 16 pieces in

Room 4), Theme 3 “Nation Building: The Age of the Envoys” (22 pieces in Room 8), and Room 9 “Hatsune *Maki-e* Lacquer Trousseau” (26 pieces), totaling 131 items (compared to 245 items in the previous year’s study), was 20 minutes on Thursday, January 5 and 30 minutes on Friday, January 6. The question of how much difference the number of pieces viewed and the duration of viewing makes to relaxation is set aside for a future study.

2.2. “Hands-on experience” experiment at “Centenarian University” in Koka City Hall (Shiga Prefecture)

- (1) **Venue:** Koka City is in southern Shiga Prefecture. It can be reached by traveling 24 minutes by train from Kyoto Station to Kibukawa Station on the JR Kusatsu Line, via Kusatsu Station on the JR Biwako Line. From the station, it is a 12-minute bus ride to Koka City Hall¹⁰ (6053 Mizuguchi, Koka City, Shiga Prefecture).
- (2) **Test subjects:** 31 residents of Koka City aged 65 and older (22M, 9F), 10 aged 80s, 16 aged 70s, and 5 aged 60s
- (3) **Date:** Friday, January 13, 2023
- (4) **Meeting and measurement place:** Conference Room 101, 1st Floor, Koka City Hall Annex
- (5) **Method of implementation:** The 31 elderly test subjects were divided into six groups (seated around two long tables to enable them to see each other’s face). Six boxes containing traditional folk artifacts were prepared and placed at the center of each group’s table. After 10 minutes, the sets of artifacts were swapped between the groups. Thus, in 30 minutes each group had “hands-on experience” with three sets of folk artifacts.
- (6) **Number and type of works experienced:** Six boxes of traditional folk artifacts prepared by the Historical and Cultural Properties Section of the Koka City Board of Education.
- (7) **Description of works:** Nostalgic folk artifacts that the test subjects now in their 60s to 80s used to use before in everyday life.
 - (i) Textbooks, abacuses
 - (ii) Split-toe shoes (*suppon-tabi*), *zori* sandals
 - (iii) Bamboo rice basket, rice box, rice scoop, kettle (kettle-rest), bamboo tube fire blower, *hakozen* meal box
 - (iv) Charcoal extinguisher, foot warmer, hot water bottle
 - (v) Set of old games (“bamboo dragonfly,” cup and ball, yo-yo, spinning top, bean bags, *menko* cards, *ohajiki* discs)
 - (vi) Sewing box, hot press, charcoal iron, washboard, washtub

¹⁰ Koka City Office website, <https://www.city.koka.lg.jp>



Fig. 2 “Hands-on experience” experiment at “Centenarian University” in Koka City (January 13, 2023)

(8) **Program for the day** (Fig. 2):

09:30 Start of registration

10:00 Opening ceremony, explanation of experiment, taking consent for measurements

10:11 Measurement #1 (physiological: blood pressure, pulse; psychological: POMS (short form))

10:25 Lecture, “What is Community Reminiscence Therapy?” by (Ms.) Maki RYUOH (Yamauchi Eco Club¹¹)

10:35 The six groups spent 10 minutes of “hands-on experience” with each of three sets of folk artifacts, discussing their reminiscences about the artifacts.

11:05 Measurement #2 (physiological: blood pressure, pulse; psychological: POMS (short form))

11:20 Reflections and presentations of each group

11:35 Closing ceremony, end, cleanup

(9) **Duration of “hands-on experience”**: 10 minutes per each of three sets of folk artifacts, totaling 30 minutes

(10) **Instructions for “hands-on experience”**: Look at and touch these nostalgic artifacts and discuss your memories of them.

(11) **Measurement methods**: Physiological (blood pressure, pulse) and psychological (POMS short form) measurements were conducted.

● **Physiological measurement**: Each test subject was given an OMRON HEM-6121 Wrist Blood Pressure Monitor to measure their blood pressure and pulse. They made two measurements, one

¹¹ Yamauchi Eco Club website, <https://yamaeco.net>

before and one after the “hands-on experience.” For each measurement, two readings and their average value were recorded.

● **Psychological measurement:** All the test subjects were asked to fill out a POMS sheet (short form, by Kaneko Shobo) before and after the “hands-on” session.

(12) **Measurement results:** Systolic (max.) blood pressure decreased slightly, while diastolic (min.) blood pressure remained largely unchanged. Pulse rate decreased.

The POMS results showed that the mean levels for all negative emotions (Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety) all decreased. At the same time, the mean value of the positive emotion of Vigor-Activity increased. Details are discussed in Section 3.

(13) **Study limitations:** In this experiment, each set of folk artifacts was experienced for a total of 30 minutes; three sets of 10-minute sessions of “hands-on experience” per set. The sets of folk artifacts prepared for this study consisted of items related to school and daily life. The question of how much difference the type and quantity of items in each set, the duration of the “hands-on” sessions, and the number of people per group makes to relaxation is set aside for future studies.

2.3. “Viewing” experiment at the “Satirical Laughs in India ink” exhibition at Minokamo City Museum (Gifu Prefecture)

- (1) **Venue:** Minokamo City Museum¹² (opened in 2000, 3299-1 Kamihachiya, Hachiya-cho, Minokamo City, Gifu Prefecture) is a 17-minute walk north of Mino-Ota Station, which can be reached in about 40 minutes from Gifu Station on the JR Takayama Line.
- (2) **Test subjects:** 16 adults (8 M, 8F), 5 aged 60s, 4 aged 50s, 6 aged 40s, and 1 aged 30s.
- (3) **Date:** Tuesday, January 24, 2023 (museum was open on this day)
- (4) **Meeting and measurement place:** Seminar Room (1F)
- (5) **Method of viewing:** Test subjects individually viewed the current “Satirical Laughs in Ink” exhibition (January 8–February 19, 2023, total of 45 works on exhibit) in the exhibition room on the first floor, twice, for 10 minutes and 20 minutes, respectively.
- (6) **Number and type of works viewed:** 45 Zen paintings by Sengai Gibon, Hakuin Ekaku, Settan Shoboku, and other artists.
- (7) **Description of works:** A variety of works from the Edo period (1603–1868) to early Meiji period (1868–1912)

“**Main exhibits**” Name of artist: title of work (material, technique, etc.), date of production

- (i) Sengai Gibon: Figurine of Daikoku (one of “Seven Deities of Good Fortune”) (ceramic)
- (ii) Hakuin Ekaku: Bodhidharma (ink on paper)
- (iii) Hakuin Ekaku: Lotus Pond Kannon (ink on paper) (1767)
- (iv) Hakuin Ekaku: Tenjin Crossing the Sea to China (ink on paper)

¹² Minokamo City Museum website, <http://www.forest.minokamo.gifu.jp>

- (v) Hakuin Ekaku: Hotei Sutasuta Bozu (ink on paper)
- (vi) Hakuin Ekaku: Hamaguri Kannon (color on silk)
- (vii) Hakuin Ekaku: Ebisu and Jurojin (two of “Seven Deities of Good Fortune”) (light color on paper)
- (viii) Hakuin Ekaku: Hakutaku (a mystical beast) (light color on paper) (1758)
- (ix) Sengai Gibon: Hibari (skylark) (ink on paper)
- (x) Hakuin Ekaku: Monkey Trying to Catch the Moon (ink on paper)
- (xi) Sengai Gibon: Lao-tzu (ink on paper)
- (xii) Sengai Gibon: Does a Dog Have Buddha Nature? (ink on paper)
- (xiii) Sengai Gibon: Harvest (ink on paper)
- (xiv) Sengai Gibon: Viewing Mt. Fuji (ink on paper)
- (xv) Sengai Gibon: Priest Xian-zi Catching Shrimp (ink on paper)
- (xvi) Sengai Gibon: Nansen Cuts the Cat in Two (ink on paper)
- (xvii) Hakuin Ekaku: The Zen Monk Ikkyu (ink on paper)
- (xviii) Sengai Gibon: Hotei (one of the “Seven Deities of Good Fortune”) (ink on paper)
- (xix) Hakuin Ekaku: Takara no Tsuchi (mallet) (ink on paper)
- (xx) Hakuin Ekaku: Suribachi (mortar) (ink on paper)
- (xxi) Hakuin Ekaku: Sedge Hat, Straw Rain Cape, Mallet and Bag (ink on paper)
- (xxii) Hakuin Ekaku: Bodhidharma (ink on paper)
- (xxiii) Hakuin Ekaku: Noyo Fujiki (calligraphy) (ink on board) (1716)
- (xxiv) Hakuin Ekaku: Bosaiki of Noyo Fujiki (calligraphy) (ink on paper)
- (xxv) Hakuin Ekaku: Anmyo (ink on paper)
- (xxvi) Sengai Gibon: Shoki (a Taoist deity) (ink on paper)
- (xxvii) Hakuin Ekaku: Kansu (tea kettle) (ink on paper)
- (xxviii) Hakuin Ekaku: Daito Kokushi (Zen monk) (ink on paper)
- (xxix) Hakuin Ekaku: Daio Kokushi (Zen monk) (ink on paper)
- (xxx) Hakuin Ekaku: Muso Kokushi (Zen monk) (ink on paper)
- (xxxi) Hakuin Ekaku: Sakyamuni Descending the Mountain after Asceticism (ink on paper)
- (xxxii) Hakuin Ekaku: Shoseki (calligraphy) (ink on paper)
- (xxxiii) Hakuin Ekaku: Hitomaru (ink on paper)
- (xxxiv) Settan Shoboku: Muso Kokushi Wandering Ox (reproduction)
- (xxxv) Settan Shoboku: Shoki (mythical plague-queller) (light color on paper)
- (xxxvi) Settan Shoboku: Bodhidharma (ink on paper)
- (xxxvii) Settan Shoboku: Daito Kokushi (Zen monk) (ink on paper)
- (xxxviii) Settan Shoboku: Landscape (light color on paper)
- (xxxix) Hakuin Ekaku: Collection of Street Preachings (folded paper book)
- (xl) “Chronological Record of Hakuin Ekaku” (paper booklet) (1821)
- (xli) “Yasen Kanwa” (paper booklet) (1887)
- (xlii) “Hakuin Zen Monk Chants of Practice” (paper booklet)

- (xliii) “Hakuin Zen Master Chants of Practice” (paper booklet) (1837)
- (xliv) “Hakuin Zen Monk Chants of Practice” (paper booklet) (1859)
- (xlv) Hakuin Seated (wood statue) (1959)



Measuring blood pressure and pulse



Psychological measurement (POMS)



Second viewing



Source: Minokamo City Museum website

Fig. 3 “Viewing” experiment at Minokamo City Museum (January 24, 2023)

(8) **Program for the day** (Fig. 3):

- 12:20 Start of registration
- 12:40 Explanation of experiment, consent for measurements
- 12:48 Measurement #1 (physiological: blood pressure, pulse; psychological: POMS (short form))
- 12:56 Move from Seminar Room to Exhibition Room
- 13:00 First viewing (10 minutes, trying to find favorite works)
- 13:10 Measurement #2, after returning to Seminar Room (physiological: blood pressure, pulse; psychological: POMS (short form))
- 13:30 Lecture
- 15:10 Break
- 15:20 Gather in Seminar Room
- 15:22 Move to Exhibition room
- 15:26 Second viewing (20 minutes, trying to find favorite works)
- 15:49 Measurement #3, after returning to Seminar Room (physiological: blood pressure, pulse; psychological: POMS (short form))
- 16:10 End, clean up

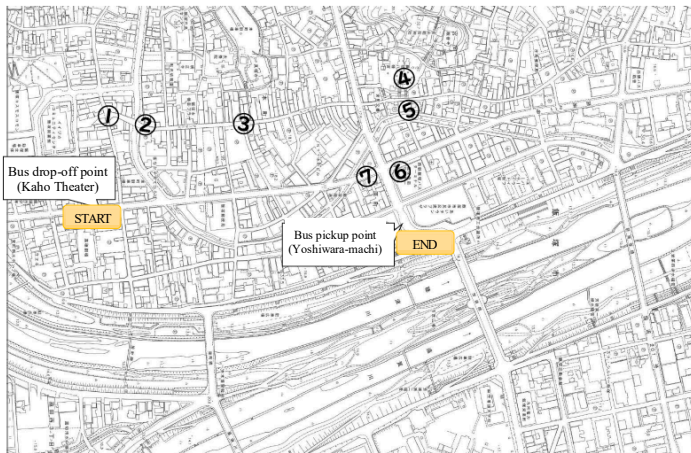
- (9) **Duration of viewing:** The average time spent by test subjects in the Exhibition Room was 10 minutes for the first viewing and 20 minutes for the second viewing.
- (10) **Instructions for viewing:** In accordance with the exhibition title, “Satirical Laughs in Ink,” look for works that make you smile or laugh in some way (e.g./guffaw,tee-hee).
- (11) **Measurement methods:** Physiological (blood pressure, pulse); psychological (POMS, short form)
- Physiological measurement: Each test subject was given an OMRON HEM-6121 Wrist Blood Pressure Monitor to measure their maximum and minimum blood pressure and pulse. Two measurements of each quantity were made at each of the three measurement times. For each quantity, two readings and their average value were recorded.
 - Psychological measurement: All the test subjects filled out a POMS sheet (short form, by Kaneko Shobo) before and after each viewing session.
- (12) **Measurement results:** Systolic (max.) blood pressure raised slightly after both the first viewing and second viewing. Diastolic (min.) blood pressure dropped slightly after the first viewing, but somewhat increased after the second viewing (compared to before each viewing). Pulse rate increased slightly after the first viewing, but decreased after the second viewing.
- POMS results showed that the mean values for all the negative emotions (Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety) decreased after viewing. There was no significant change in the mean value for the positive emotion of Vigor-Activity. Further details will be discussed in Section 3.
- (13) **Study limitations:** When walking from the Seminar Room to the Exhibition Room, the test subjects were able to see the green of the forest outside the museum through the glass on their left for approximately 30 seconds. For this reason, it will be necessary in a future study to try and investigate the relationship between the simultaneous influences of “museum bathing” and “forest bathing.”

2.4. “Town walking” experiment at Iizuka City Historical Museum (Fukuoka Prefecture)

- (1) **Venue:** Seminar Room of the Iizuka City Historical Museum¹³ (opened in 1981, 959-1 Kayanomori, Iizuka City), located in central Fukuoka Prefecture. The museum is about a 5-minute walk from Shin-Iizuka Station, which can be reached from JR Hakata Station using the JR Sasaguri Line and Chikuho Main Line. The “town walking” covered seven locations in Iizuka City (Fig. 4).
- (2) **Test subjects:** 9 adults (6M, 3 F), 1 aged 80s, 4 aged 70s, 1 aged 60s, 1 aged 50s, and 2 aged 20s.
- (3) **Date:** Sunday January 29, 2023
- (4) **Meeting and measurement place:** Seminar Room, 1st Floor, Iizuka City Historical Museum

¹³ Iizuka City Historical Museum website, <https://www.city.iizuka.lg.jp/rekishi/>

- (5) **“Town walking” method:** Physiological and psychological measurements are made in the Seminar Room on the first floor of the museum before and after the “town walk.” The test subjects, divided into three groups of three, visited seven spots shown in old photos one by one, starting from the first spot. The groups took photos of each spot and discussed how it has changed. The tests subjects returned to the museum from the seventh and final spot by bus. After returning to the museum, each group continued to discuss how each spot has changed since the old photo was taken, and based on their discussions the group members wrote a



At Point (3) in Iizuka (#2)

Iizuka Past and Present: Connecting “Memories of Iizuka” to the Future



			
Title	Celebration of completion of Iizuka City Honmachi Arcade	Title	
Year	1959	Year	
Place	Iizuka Honmachi	Place	
Remarks		Remarks	
Past		Present	
<p>Connect your thoughts to the future! (Write down what you feel when you compare the past and present!)</p> <p>Date: Y() M() D ()</p> <p>Name: () Address: Age:</p> <p>M / F</p>			
<p>“Memories of Iizuka” is an attempt to record impressions comparing the past and present of Iizuka City and connecting your thoughts to the future by posting this record on the Internet. * We plan to post the records online by the end of March 2024, but we cannot publish all the records. Note that records may also be displayed at the Iizuka City Historical Museum in the future.</p>			
Iizuka City Historical Museum			

Fig. 4: “Town walking” experiment at the Iizuka City Historical Museum (January 29, 2023)
“Top left: “Town walking” route map; top right: Photo taken at Spot (3); bottom: “Memories of Iizuka” worksheet”

reflection on their experience of revisiting each spot after so many years on the “Memory of Iizuka” worksheet (at the bottom left of Fig. 4).

- (6) **“Town walking” route and places visited:** Moving in order from Spots 1 to 7, as shown in Fig. 4, it took the test subjects about 60 minutes to complete the walk, including the time needed to find the precise places corresponding to the old photos on the worksheets (at the bottom left of Fig. 4) and to take photos. The total length of the walk was approximately 3,000 steps.
- (7) **Descriptions of the seven old photos:**
 - (i) View of Mukaimachi from area where Mukaimachi, Higashimachi and Honmachi meet (1961)
 - (ii) View of Honmachi-dori Street (1961)
 - (iii) Celebration of completion of Iizuka City Honmachi Arcade (1959)
 - (iv) View of Yoshiharamachi from Noso Hachimangu Shrine (1920)
 - (v) Shinmeibashi Bridge (in front of Noso Hachimangu Shrine) (1963)
 - (vi) View of Showa-dori Street from bus center (1967)
 - (vii) Nishitetsu bus stop (1945?)
- (8) **Program for the day** (Fig. 4, bottom right):
 - 12:30 Start of registration
 - 13:00 Opening ceremony, consent for measurement
 - 13:10 Measurement #1 (physiological: blood pressure, pulse; psychological: POMS (short form))
 - 13:30 Travel by bus to Spot 1, split up into three groups, and walk to each of the seven places successively
 - 14:50 Meet at Spot 7
 - 15:00 Take bus back to Iizuka City Historical Museum
 - 15:10 Rest after return to museum
 - 15:25 Review walk in groups
 - 15:35 Measurement #2 (physiological: blood pressure, pulse; psychological: POMS (short form))
 - Explanation of “museum bathing” research by Izumi Ogata, Faculty of Collaborative Regional Development, Kyushu Sangyo University
 - 15:50 Presentation by each group on their reflections
 - 16:10 Closing ceremony, end, cleanup
- (9) **Duration of “town walking”:** The test subjects walked in order from Spot 1 to Spot 7, taking approximately 60 minutes in total.
- (10) **Instructions for “town walking”:** Find the seven spots where the old photos were taken. Take a picture of each spot as it appears now and discuss how the spot has changed since the photo was taken with the other group members.
- (11) **Measurement methods:** Physiological (blood pressure, pulse) and psychological (POMS short form) measurements were conducted.
 - Physiological measurement: Each test subject was given an OMRON HEM-6121 Wrist Blood Pressure Monitor to measure their maximum and minimum blood pressure and pulse. Two

measurements of each quantity were made, one before and one after the “town walking” experience. For each quantity, two readings and their average value were recorded.

● **Psychological measurement:** All the test subjects filled out a POMS sheet (short form, by Kaneko Shobo) before and after the “town walking.”

(12) **Measurement results:** Systolic (max.) blood pressure was slightly higher and diastolic (min.) blood pressure was somewhat higher after the walk. Pulse rate was somewhat lower after the walk.

POMS results showed that the mean values for all the negative emotions (Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety) were lower after the walk. The mean value for the positive emotion of Vigor-Activity was slightly higher after the walk. Further details will be discussed in Section 3.

(13) **Study limitations:** In this study, the subjects walked about 3,000 steps from Spot 1 to Spot 7. According to the physiological measurement data, the test subjects did not suffer excessive physical stress, but the question of whether it is appropriate to ask test subjects to walk this much will be reviewed. I also intend to investigate whether there is any difference in relaxation between this type of walking tour, looking at old photos, and simply walking without engaging in other activity.

2.5. “Viewing” experiment in Exhibition Rooms 1 and 2 of Miyakojima City Museum (Okinawa Prefecture)

- (1) **Venue:** Miyakojima City Museum¹⁴ (opened in 1989, 1166-287 Higashinakasonezoe, Miyakojima City, Okinawa Prefecture). It is located about 10 minutes by car from Miyako Airport.
- (2) **Test subjects:** 13 adults (5M, 8F), 4 aged 70s, 3 aged 60s, 3 aged 50s, 2 aged 40s, and 1 aged 20s.
- (3) **Date:** Sunday February 12, 2023 (museum was open on this day)
- (4) **Meeting and measurement place:** Seminar Room (1F)
- (5) **Viewing method:** The test subjects were divided into two groups (of 7 and 6) for viewing in Exhibition Room 1 (Archaeology, History, Folklore) and Exhibition Room 2 (Natural Science, Arts and Crafts) of the museum. In the first viewing session, the test subjects spent 20 minutes viewing the exhibits individually. In the second session, after lying down on couches or the tatami floor in the Special Exhibition Room on the first basement floor (B1F) to view a ceiling painting titled “Vortex” and listen to an explanation of the work by the curator, the test subjects proceeded to view other works designated by the curator—“Miyako Jofu” (hemp cloth) and “Poll Tax” in Exhibition Room 1, and “Typhoons and Disasters” and “Miyako Jofu” in Exhibition Room 2. The total viewing time of the second session was 20 minutes. In

¹⁴ Miyakojima City Museum website, <https://www.city.miyakojima.lg.jp/soshiki/kyouiku/syougaiakusyu/hakubutsukan/index.html>

both the first and second viewings, Group 1 was assigned to view only in Exhibition Room 1, and Group 2 only in Exhibition Room 2.

* Works designated by the curator

Title: “Vortex” (ceiling painting); location: Special Exhibition Room; supervision: Chosho ASHITOMI; production: Meiso SHIMOJI, Norio SUNAGAWA, Bin YONAHARA, 1989

(6) **Number and type of works viewed:** Works of archaeology and history, folklore, natural sciences, and arts and crafts; the number of artworks viewed is unknown.

(7) **Descriptions of viewed works:** The museum has two exhibition rooms.

● Contents of Exhibition Hall 1 (Archaeology and History, Folklore)

(**Archaeology and History**): Materials from the Miyako Islands from prehistoric times to the Pacific War period

(**Folklore**): Materials related to the agriculture, fishing, beliefs, and folk customs of the Miyako Islands

* Main exhibited materials (period)

(**Archaeology and History**):

- (i) “Giant clam” shell axe (prehistoric)
- (ii) Miyako-style earthenware (Gusuku period)
- (iii) Historical materials of sea drifters from Jeju Island (Korea) (1477); Miyako *jofu* textiles were recorded in the materials.
- (iv) Hairpin with gold head and silver stem (16th century)
- (v) Materials related to earthquake and devastating tsunami of Kenryu 36 (1771)
- (vi) Materials related to the poll tax abolition movement (Meiji period); Miyako *jofu* (hemp cloth) was paid as tribute under the poll tax system
- (vii) Pacific War-related materials (around 1945)

(**Folklore**):

- (i) Diorama of Paantu, supernatural being associated with good fortune and dispelling evil spirits
- (ii) Farming tools
- (iii) Fishing tools
- (iv) *Kayaya* (thatched houses)
- (v) Panels capturing folk events around the island

● Contents of Exhibition Hall 2 (Natural Science, Arts and Crafts)

(**Natural Science**): Materials related to the geology, strata, fauna, weather, etc. of the Miyako Islands

(**Arts and Crafts**) : Paintings, Miyako *jofu* textiles, and materials handed down in the old families of the Miyako Islands

* Main exhibited materials (period)

(**Natural Sciences**):

- (i) Diorama of underground dam

- (ii) Panels on typhoons and global warming, with explanations of past typhoons that have devastated the Miyako Islands, e.g., Typhoon Sarah (1959), Typhoon Cora (1966), Typhoon Della (1968), and Typhoon Maemi (2003). The highest instantaneous wind speed ever observed in Japan, 85.3 m/s, was recorded during Typhoon Cora.
- (iii) Diorama of taxidermy birds
- (iv) Insect specimens
- (v) Plant specimens
- (vi) Shellfish specimens
- (vii) Reptile and amphibian specimens
- (viii) Stuffed mammals

(**Art and Crafts**[creator, year of production]):

- (i) Miyako *jofu* textiles
- (ii) “Illustration of Kuramoto and surroundings” (Masashige MIYAHARA, 1991)
- (iii) Chudo-uji Nakasone family-related materials
- (iv) Shoei-uji Motomura family-related materials
- (v) Eishun-uji Ishimine family-related materials
- (vi) Nema-uji Miyaguni-family related materials

(8) **Program for the day** (Fig. 5):

- 12:30 Start of registration
- 13:00 Explanation of experiment, taking consent for measurements
- 13:08 Measurement #1 (physiological: blood pressure, pulse; psychological: POMS (short form))
- 13:25 Move from Seminar Room to Exhibition Rooms 1 and 2
- 13:30 First viewing (20 minutes, to find favorite works)
- 13:53 Measurement #2, after returning to Seminar Room (physiological: blood pressure, pulse; psychological: POMS (short form))
- 14:10 Break
- 14:25 After gathering in Seminar Room, move to Special Exhibition Room to view and listen to explanation of the ceiling painting “Vortex” by the curator
- 14:33 After explanation of work, move to Exhibition Rooms 1 and 2.
- 14:35 Second viewing (20 minutes, groups respectively search for exhibits indicated by the curator—“Miyako Jofu” (hemp cloth) and “Poll Tax” in Exhibition Room 1, and “Typhoons and Disasters” and “Miyako Jofu” in Exhibition Room 2
- 14:56 Measurement #3, after returning to Seminar Room (physiological: blood pressure, pulse; psychological: POMS (short form))
- 15:10 Lecture, “Frontiers of Museum Bathing Research” by Izumi Ogata, Faculty of Collaborative Regional Development, Kyushu Sangyo University
- 15:20 Brief reflections by the test subjects
- 15:30 End, cleanup

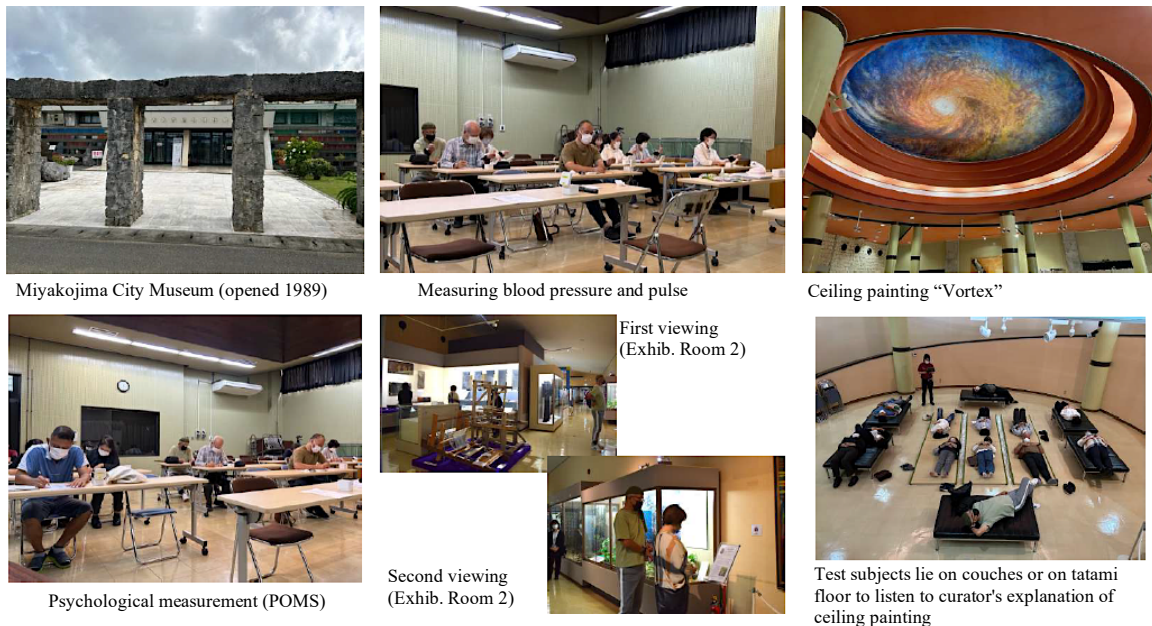


Fig. 5 “Viewing” experiment at Miyakojima City Museum (February 12, 2023)

- (9) **Duration of “viewing”:** The average viewing time of the test subjects was 20 minutes for the first session and 20 minutes for the second session.
- (10) **Instructions for “viewing”:** In the first viewing, find your favorite works and materials; in the second viewing, as a group, look for the specific items indicated by the curator during the explanation of the ceiling painting “Vortex”—“Miyako Jofu” and “Poll Tax” (Exhibition Room 1) and “Typhoon Disasters” and “Miyako Jofu” (Exhibition Room 2).
- (11) **Measurement methods:** Physiological (blood pressure, pulse) and psychological (POMS short form) measurements were conducted.

● **Physiological measurement:** Each test subject was given an OMRON HEM-6121 Wrist Blood Pressure Monitor to measure their maximum and minimum blood pressure and pulse. Two measurements of each quantity were made, one before and one after each viewing. For each quantity, two readings and their average value were recorded.

● **Psychological measurement:** All the test subjects filled out a POMS sheet (short form, by Kaneko Shobo) before and after each viewing.

(12) **Measurement results:**

● **Exhibition Room 1 (Archaeology, History, Folklore)**

(1) Systolic (max.) blood pressure and diastolic (min.) blood pressure were lower after the first viewing, but increased again after the second viewing. (2) Pulse rate was lower after the first and second viewings (compared to Measurement #1). (3) POMS results showed that the mean values for all the negative emotions (Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety) were lower after each viewing, compared to Measurement #1). Conversely, the mean value for the positive emotion of Vigor-Activity was higher after each of the two viewings (compared to Measurement #1).

● **Exhibition Room 2 (Natural Sciences, Arts and Crafts)**

(1) Systolic (max.) blood pressure was lower after the first viewing but higher after the second viewing (compared to Measurement #1 before the first viewing). Diastolic (min.) blood pressure increased slightly after each of the two viewings. (2) Pulse rate was decreased slightly after the first viewing, but increased after the second viewing. (3) POMS results showed that the mean values for all the negative emotions (Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety) were lower after each viewing. The mean value for the positive emotion of Vigor-Activity decreased after the first viewing but increased after the second viewing. Further details will be explained in Section 3.

(13) **Study limitations:** To measure how much physiological and psychological impact the types of exhibits make, the 13 test subjects were divided into two groups that were each assigned a fixed exhibition area. Both in the first and second viewing sessions, Group 1 did its viewing in Exhibition Room 1 and Group 2 in Exhibition Room 2. It is set aside for further studies to compare the results of when the test subjects are designated the materials to view and when they can move freely through the exhibition areas.

3. Results and reflections on the museum bathing experiments based on “viewing,” “hands-on experience,” and “town walking”

3.1. “Viewing” experiment at in Cultural Exchange Exhibition Hall of Kyushu National Museum (January 5, 2023)

3.1.1. Comparison of physiological measurements (max. blood pressure, min. blood pressure, pulse) before and after 20 minutes of “viewing” (test subjects: Junior and senior high school students)

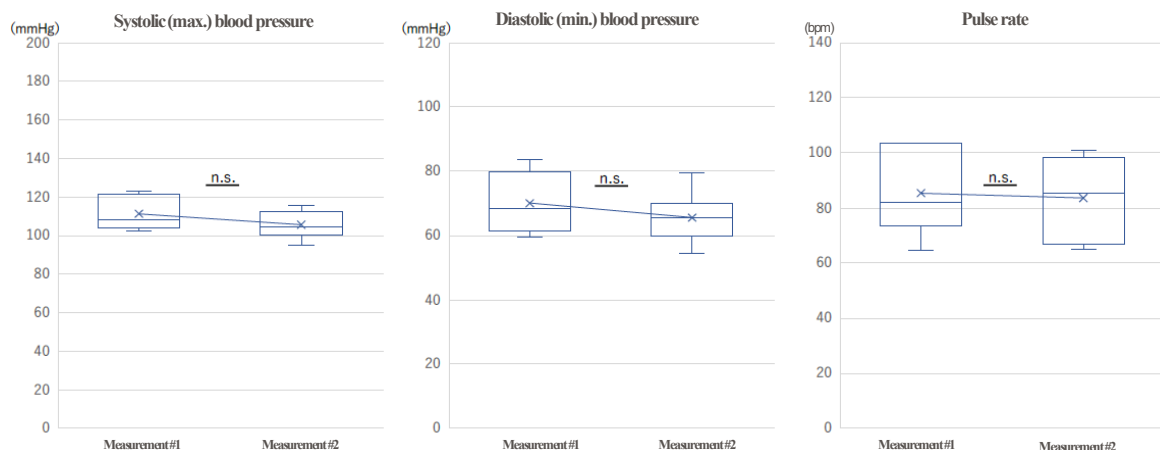


Fig.6 Comparison of max. blood pressure/min. blood pressure/pulse before and after “viewing” (January 5, junior and senior high school students) n.s.: $p > 0.05$

As Fig. 6 shows, the mean values of max. and min. blood pressure (systolic and diastolic blood pressure) after viewing were 5.75 mmHg and 4.5 mmHg lower than before viewing, respectively.

The mean pulse rate after viewing decreased by 1.75 bpm lower.

However, in all cases the observed differences were not statistically significant ($p < 0.05$).

3.1.2. Comparison of physiological measurements (max. blood pressure, min. blood pressure, pulse) before and after 20 minutes of “viewing” (test subjects: adults)

As Fig. 7 shows, mean values of max. and min. blood pressure (systolic and diastolic blood pressure) after viewing were 3.21 mmHg and 0.41 mmHg lower than before viewing, respectively.

The mean pulse rate after viewing was 1.0 bpm was lower.

Only the difference in max. blood pressure was statistically significant ($p < 0.05$).

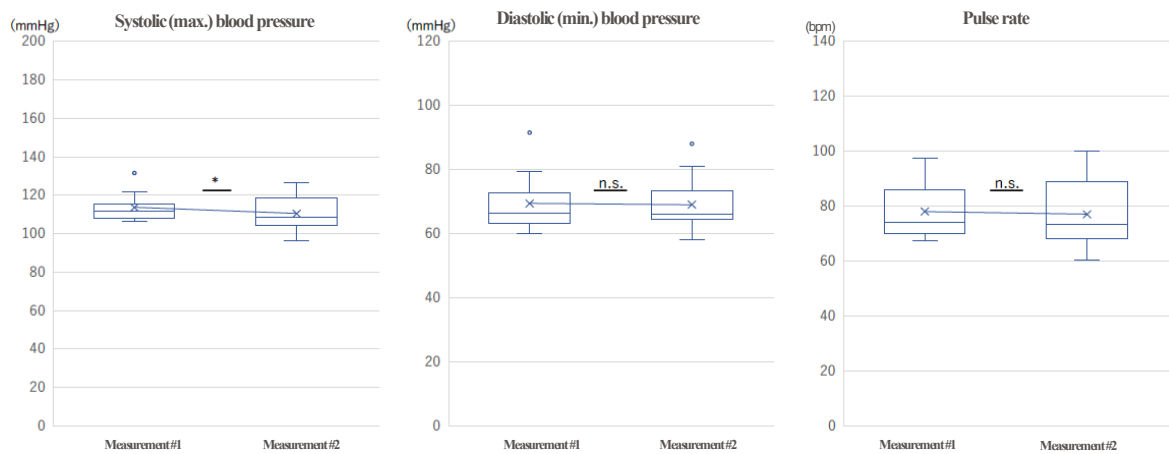


Fig. 7 Comparison of max. blood pressure/min. blood pressure/pulse before and after “viewing” (January 5, adults) *: $p < 0.05$, n.s.: $p > 0.05$

3.1.3. Comparison of psychological measures (POMS) before and after 20 minutes of “viewing” (test subjects: Junior and senior high school students)

The results of the POMS measurements (Figs. 8 and 9) show that the mean values for all the negative emotions were lower after viewing, by the following amounts: Anger-Hostility (2.5 points), Confusion-Bewilderment (3.33 points), Depression-Dejection (1.0 point), Fatigue-Inertia (2.84 points) and Tension-Anxiety (4.67 points). These results show that museum bathing affected the negative mood states of the test subjects, reducing their psychological stress.

The mean value for the positive emotion Vigor-Activity was slightly lower after the viewing (by 0.67 points). This suggests that museum bathing did not significantly affect the positive mood state of the test subjects.

Only the observed differences in Anger-Hostility, Confusion-Bewilderment, and Tension-Anxiety were statistically significant ($p < 0.05$).

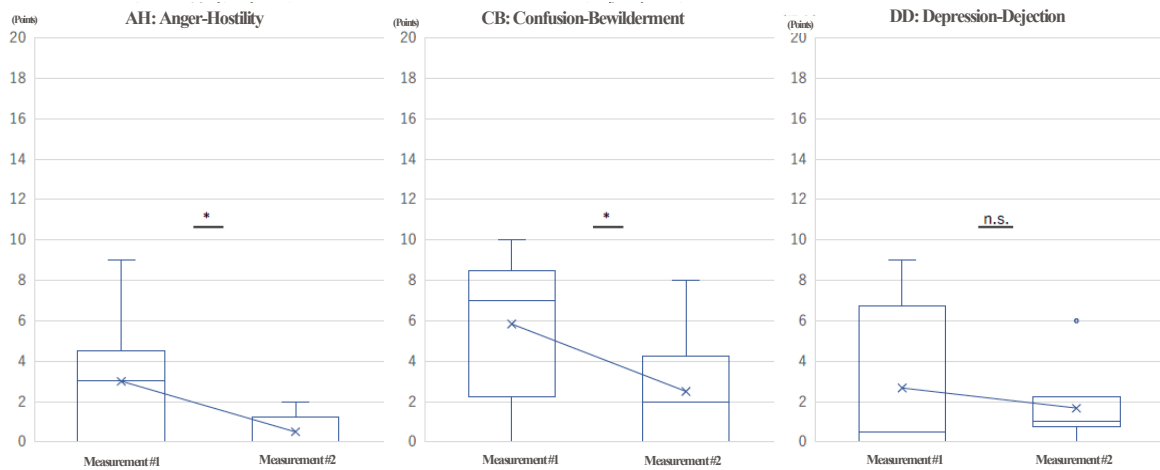


Fig. 8 Comparison of POMS measurements before and after “viewing” (1) (January 5, Junior and senior high school students) *: $p < 0.05$, n.s.: $p > 0.05$

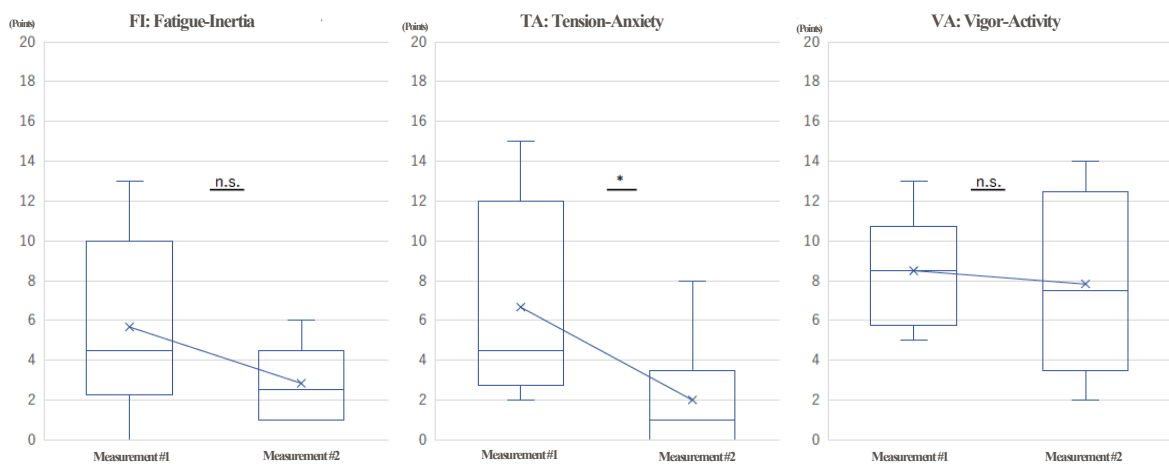


Fig. 9 Comparison of POMS measurements before and after “viewing” (2) (January 5, HS students) *: $p < 0.05$, n.s.: $p > 0.05$

3.1.4. Comparison of psychological measures (POMS) before and after 20 minutes of “viewing” (test subjects: adults)

The results of the POMS measurements (Figs. 10 and 11) show that the mean values for all the negative emotions were lower after viewing, by the following amounts: Anger-Hostility (1.17 points), Confusion-Bewilderment (2.17 points), Depression-Dejection (1.83 point), Fatigue-Inertia (1.83 points) and Tension-Anxiety (3.42 points). These results show that museum bathing affected the negative mood states of the test subjects, reducing their psychological stress.

The mean value for the positive emotion Vigor-Activity was slightly lower (by 0.17 points) after the viewing. This suggests that museum bathing did not significantly affect the positive mood state of the test subjects.

Only the observed differences in Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety were statistically significant ($p < 0.05$).

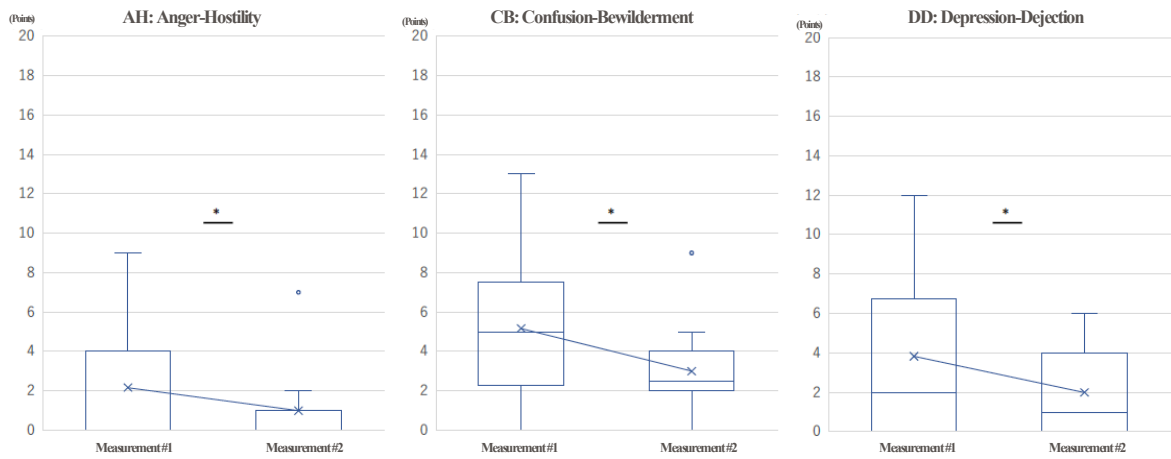


Fig. 10 Comparison of POMS measurements before and after “viewing” (1) (January 5, adults) *: $p < 0.05$

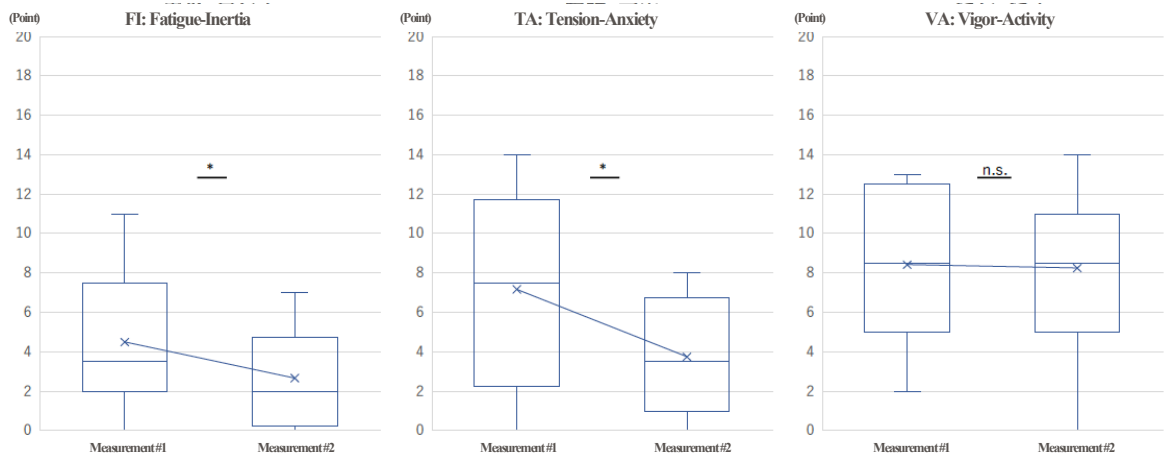


Fig. 11 Comparison of POMS measurements before and after “viewing” (2) (January 5, adults) *: $p < 0.05$, n.s.: $p > 0.05$

3.2. “Viewing” experiment at Cultural Exchange Exhibition Hall of Kyushu National Museum (January 6, 2023)

3.2.1. Comparison of physiological measurements (max. blood pressure, min. blood pressure, pulse) before and after 30 minutes of “viewing” (test subjects: HS students)

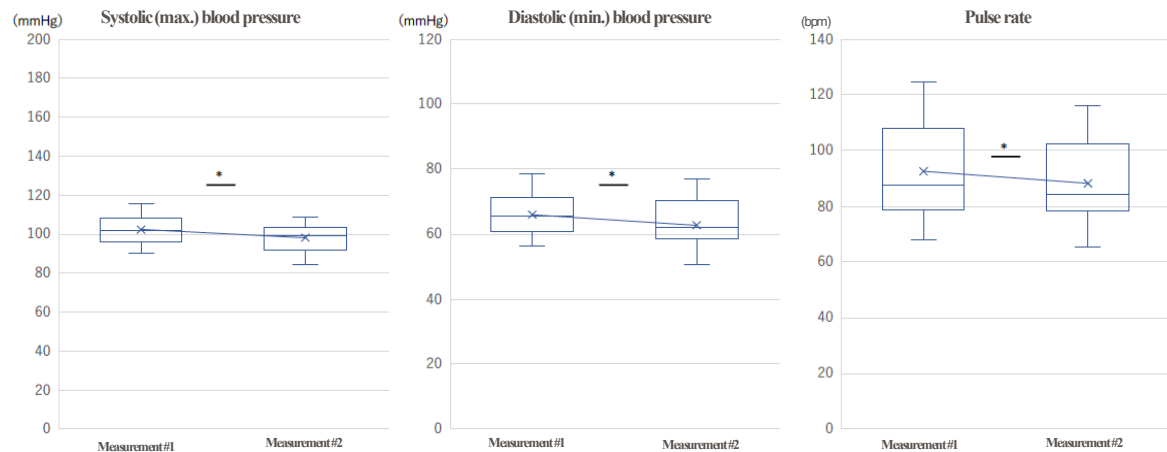


Fig. 12: Comparison of max. blood pressure/min. blood pressure/pulse before and after “viewing” (January 6, HS students) *: $p < 0.05$

As Fig. 12 shows, the mean values of max. and min. blood pressure (systolic and diastolic blood pressure) after viewing were 4.18 mmHg and 3.25 mmHg lower than before viewing, respectively.

The mean pulse rate after viewing was 4.32 bpm lower.

All of these observed differences were statistically significant ($p < 0.05$).

3.2.2. Comparison of psychological measurements (POMS) before and after 30 minutes of “viewing” (test subjects: Junior and senior high school students)

The results of the POMS measurements (Figs. 13 and 14) show that the mean values for all the negative emotions were lower after viewing, by the following amounts: Anger-Hostility (0.5 points), Confusion-Bewilderment (2.28 points), Depression-Dejection (1.43 point), Fatigue-Inertia (3.5 points) and Tension-Anxiety (2.93 points). These results show that museum bathing impacted the negative mood states of the test subjects, reducing their psychological stress.

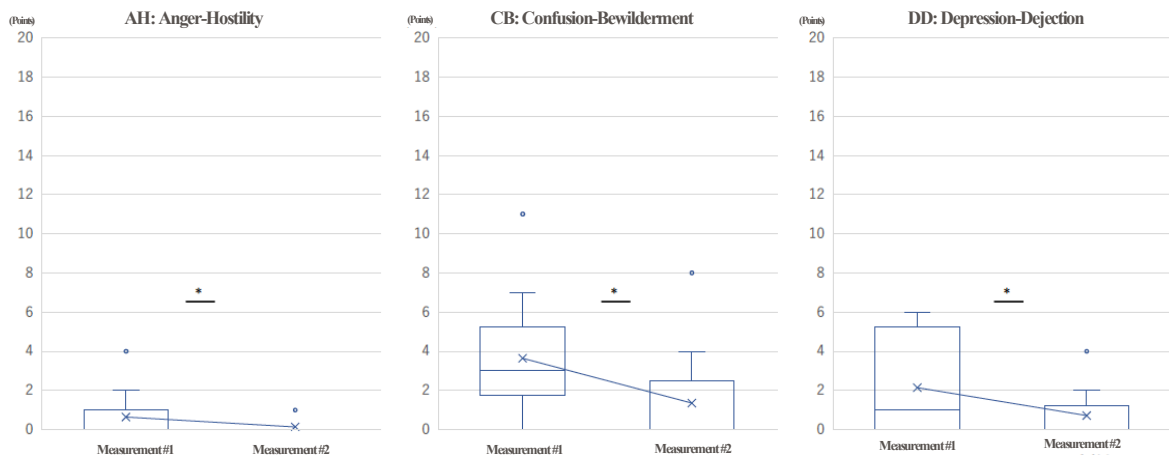


Fig. 13 Comparison of POMS measurements before and after “viewing” (1) (January 6, HS students) *: $p < 0.05$

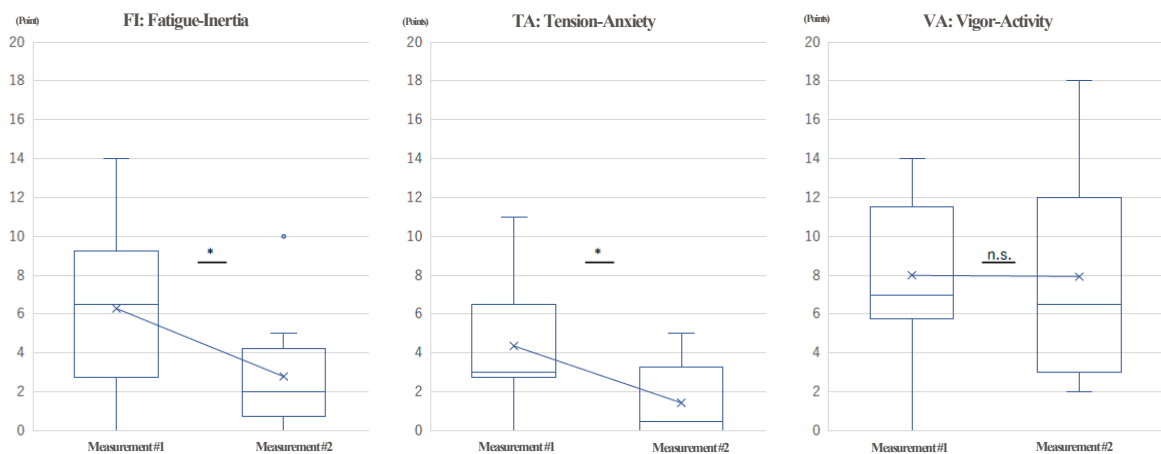


Fig. 14 Comparison of POMS measurements before and after “viewing” (2) (January 6, Junior and senior high school students) *: $p < 0.05$, n.s.: $p > 0.05$

The mean value for the positive emotion Vigor-Activity was very slightly higher after the viewing (by 0.07 points). This suggests that museum bathing did not significantly affect the positive mood state of the test subjects.

The observed differences in Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety were all statistically significant ($p < 0.05$).

3.3. Results of “hands-on experience” experiment at “Centenarian University” at Koka City Hall (Shiga Prefecture)

3.3.1. Comparison of physiological measurements (max. blood pressure, min. blood pressure, pulse) before and after “hands-on experience”

As Fig. 15 shows, the mean values of max. and min. blood pressure (systolic and diastolic blood pressure) after “hands-on experience” were 1.96 mmHg higher and 0.24 mmHg lower than before viewing, respectively.

The mean pulse rate after “hands-on experience” was 4.81 bpm lower.

However, only the observed difference in pulse rate was statistically significant ($p < 0.05$).

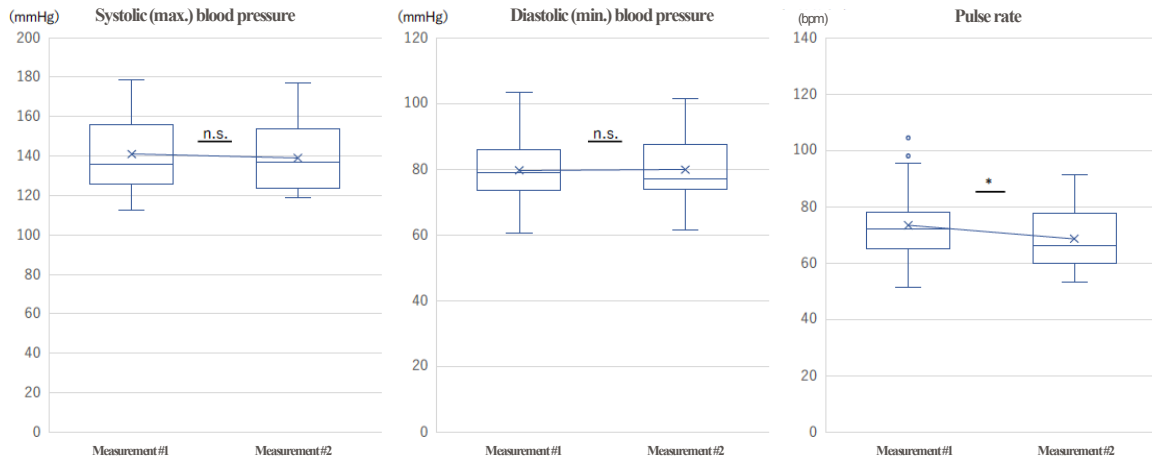


Fig. 15 Comparison of max. blood pressure/min. blood pressure/pulse before and after “hands-on experience” *: $p < 0.05$, n.s.: $p > 0.05$

3.3.2. Comparison of psychological measures (POMS) before and after “hands-on experience”

The results of the POMS measurements (Figs. 16 and 17) show that the mean values for all the negative emotions were lower after viewing, by the following amounts: Anger-Hostility (1.06 points), Confusion-Bewilderment (1.49 points), Depression-Dejection (1.68 point), Fatigue-Inertia (0.68 points) and Tension-Anxiety (1.81 points). These results show that museum bathing affected the negative mood states of the test subjects, reducing their psychological stress.

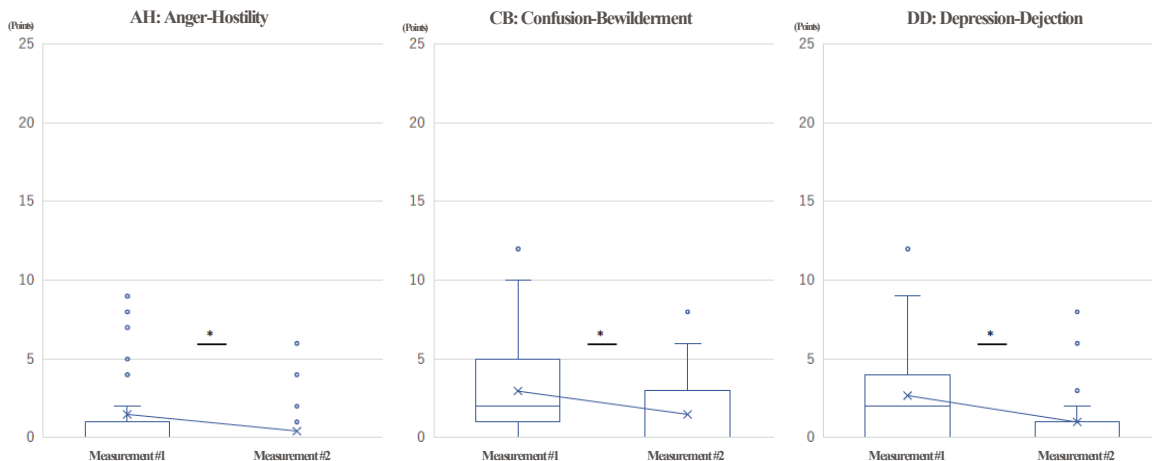


Figure 16 Comparison of POMS measurements before and after “hands-on experience” (1) *: $p < 0.05$

The mean value for the positive emotion Vigor-Activity was higher after the “hands-on experience” (1.81 points). This suggests that museum bathing significantly affected the positive mood state of the test subjects.

The observed differences were all statistically significant ($p < 0.05$) except in Fatigue-Inertia.

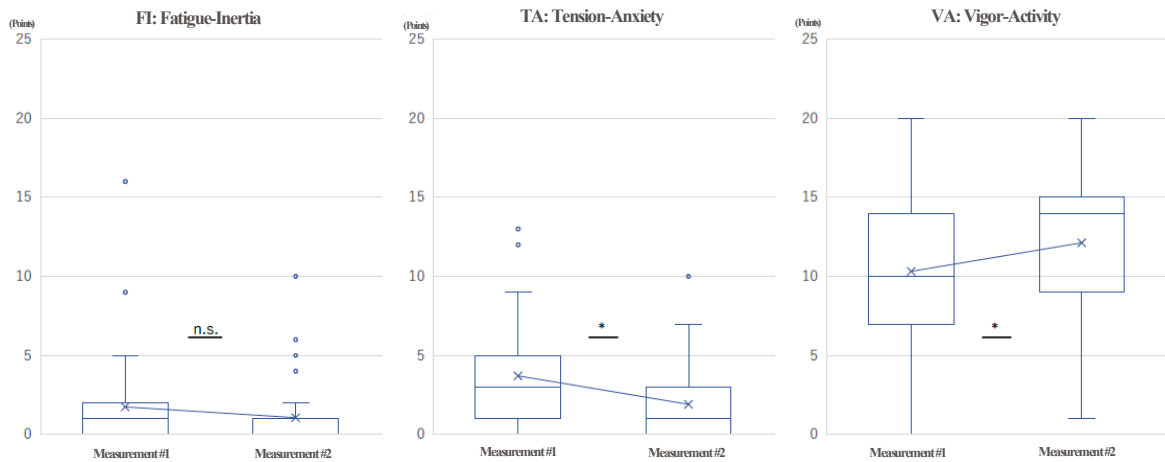


Fig. 17 Comparison of POMS measurements before and after “hands-on experience” (2) *: $p < 0.05$, n.s.: $p > 0.05$

3.4. Results of “viewing” experiment at the “Satirical Laughs in Ink” exhibition at Minokamo City Museum

3.4.1. Comparison of physiological measurements (max. blood pressure, min. blood pressure, pulse) before and after “viewing”

As Fig. 18 shows, the mean values of maximum (systolic) blood pressure were very slightly higher after both the first viewing of 10 minutes and the second viewing of 20 minutes, by 0.47 mmHg and 0.62 mmHg, respectively. The mean values of minimum (diastolic) blood pressure were 2.63 mmHg lower after the first 10-minute viewing, and 4.78 mmHg higher after the second 20-minute viewing.

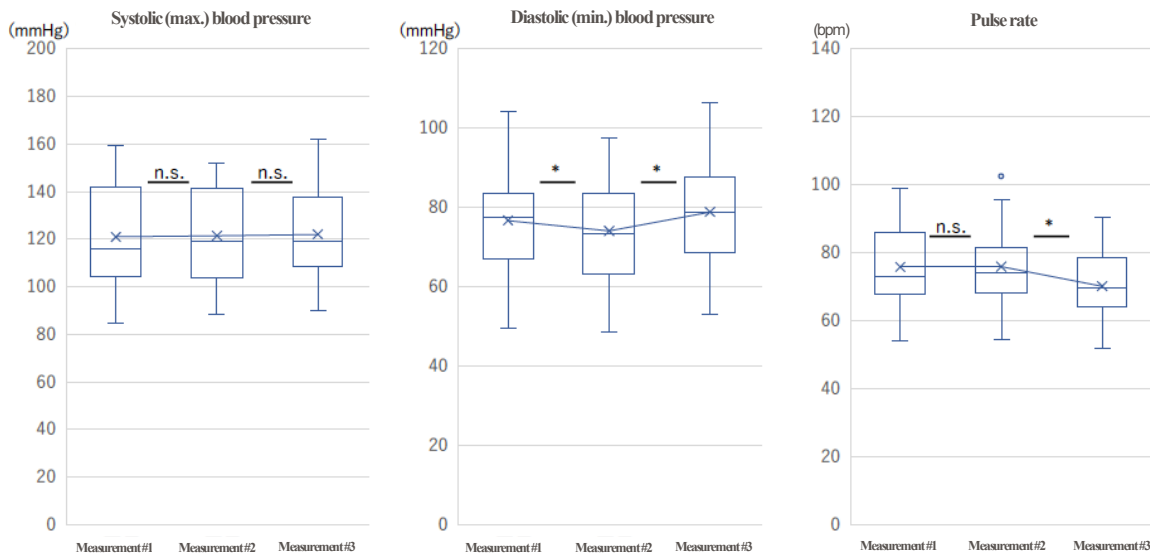


Fig. 18 Comparison of max. blood pressure/min. blood pressure/pulse before and after “viewing” *: $p < 0.05$, n.s.: $p > 0.05$

The mean pulse rate after the first 10-minute viewing was slightly higher (by 0.03 bpm), but was substantially lower after the second 20-minute viewing (by 5.72 bpm).

The statistically significant observed differences ($p < 0.05$) were the changes in minimum blood pressure after the first 10-minute viewing and after the second 20-minute viewing, and the change in pulse rate after the second 20-minute viewing.

3.4.2. Comparison of psychological measurements (POMS) before and after 30 minutes of “viewing”

The mean values of the POMS measurements (Figs. 19 and 20) show the following. Anger-Hostility slightly decreased both after the first 10-minute viewing and after the second 20-minute viewing, by 1.0 point and 0.81 points, respectively. Confusion-Bewilderment slightly decreased both after the first 10-minute viewing and after the second 20-minute viewing, by 0.81 points and 0.38 points, respectively. Depression-Dejection decreased a little after the first 10-minute viewing and increased a little after the second 20-minute viewing, by 0.5 points and 0.19 points, respectively. Fatigue-Inertia slightly decreased both after the first 10-minute viewing and after the second 20-minute viewing, by 0.75 points and 0.44 points, respectively. Tension-Anxiety decreased a little after the first 10-minute viewing by 1.12 points and decreased by 1.69 points after the second 20-minute viewing. Thus, the mean values for all the negative emotions were lower after viewing. This shows that museum bathing impacted the negative mood states of the test subjects, reducing their psychological stress.

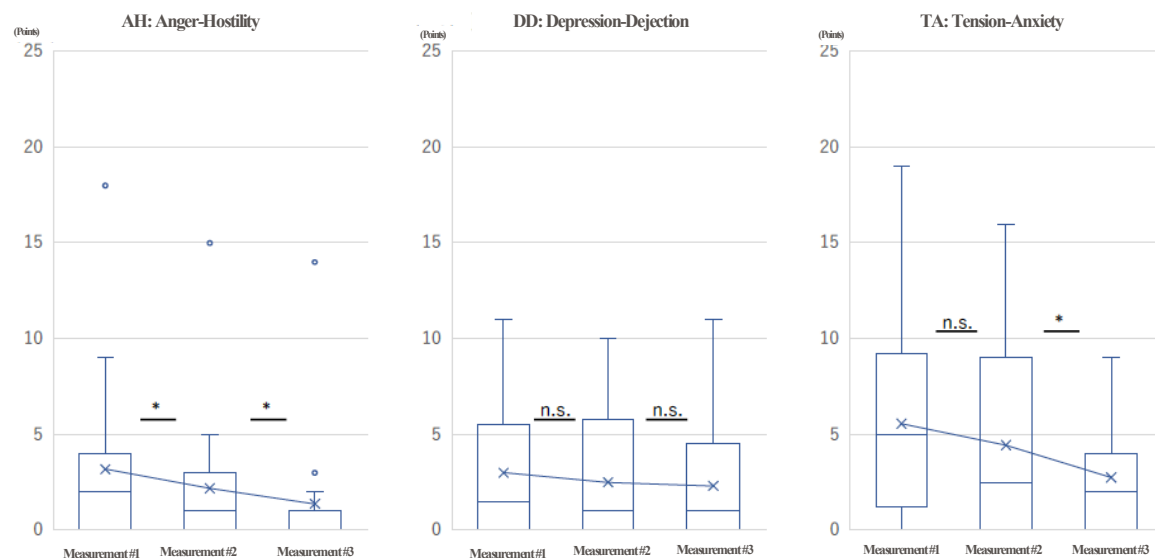


Fig. 19 Comparison of POMS measurements before and after “viewing” (1) *: $p < 0.05$, n.s.: $p > 0.05$

The mean value for the positive emotion Vigor-Activity was slightly higher after the first 10-minute viewing (by 0.13 points) and slightly lower after the second 20-minute viewing (by 0.13 points). This suggests that museum bathing did not significantly affect the positive mood state of the test subjects.

Only the observed differences in Anger-Hostility (both after the first and second viewings) and in Tension-Anxiety (after the second viewing) were statistically significant ($p < 0.05$).

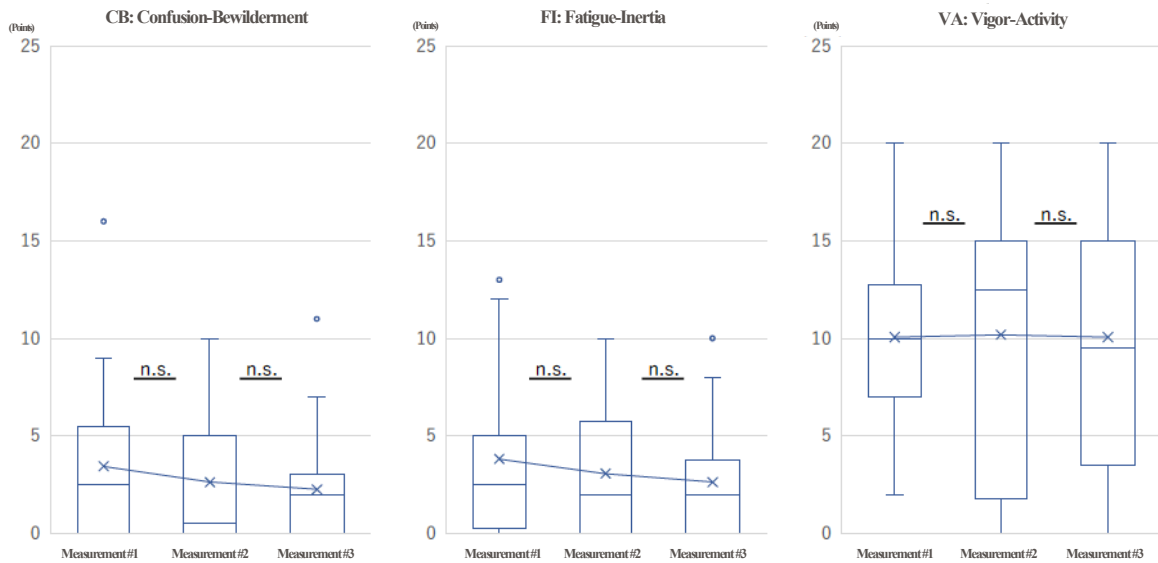


Fig. 20 Comparison of POMS measurements before and after “viewing” (2) n.s.: $p > 0.05$

3.5. Results of “town walking” experiment at Iizuka City Historical Museum (Fukuoka Prefecture)

3.5.1. Comparison of physiological measurements (max. blood pressure, min. blood pressure, pulse) before and after “town walking”

As Fig. 21 shows, the mean value of max. (systolic) blood pressure increased slightly after “town walking” (by 0.22 mmHg). The mean value of min. (diastolic) blood pressure increased significantly after “town walking” (by 2.83 mmHg).

The mean pulse rate after “town walking” was somewhat lower (by 2.77 bpm).

The observed differences in all three values (max. and min. blood pressure, and pulse) were all statistically significant ($p < 0.05$).

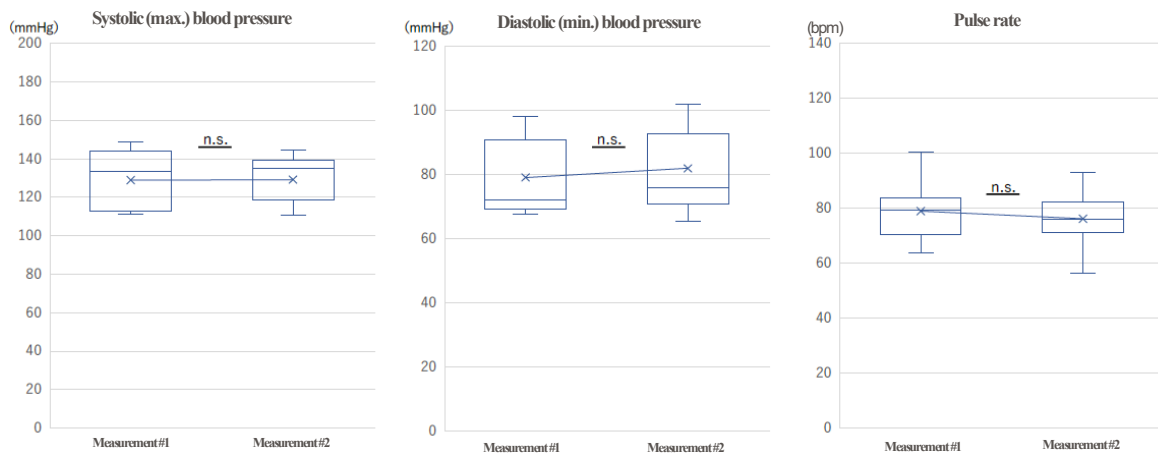


Fig. 21 Comparison of max. blood pressure/min. blood pressure/pulse before and after “town walking” n.s.: $p > 0.05$

3.5.2. Comparison of psychological measures (POMS) before and after “town walking”

The results of the POMS measurements (Figs. 22 and 23) show that the mean values for all the negative emotions were lower after “town walking,” by the following amounts: Anger-Hostility (1.11 points), Confusion-Bewilderment (1.44 points), Depression-Dejection (1.00 point), Fatigue-Inertia (1.33 points) and Tension-Anxiety (2.45 points). These results show that this activity affected the negative mood states of the test subjects, reducing their psychological stress.

The mean value for the positive emotion Vigor-Activity was higher after “town walking” (by 2.22 points). This suggests that this museum bathing activity significantly affected the positive mood state of the test subjects.

Only the observed differences in Depression-Dejection, Tension-Anxiety, and Vigor-Activity were statistically significant ($p < 0.05$).

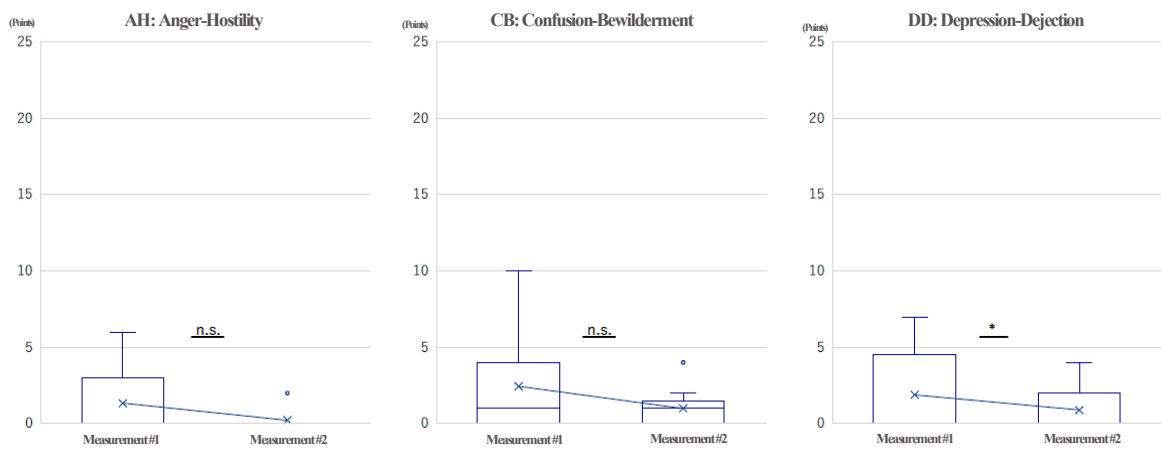


Fig. 22 Comparison of POMS measurements before and after “town walking” (1) *: $p < 0.05$, n.s.: $p > 0.05$

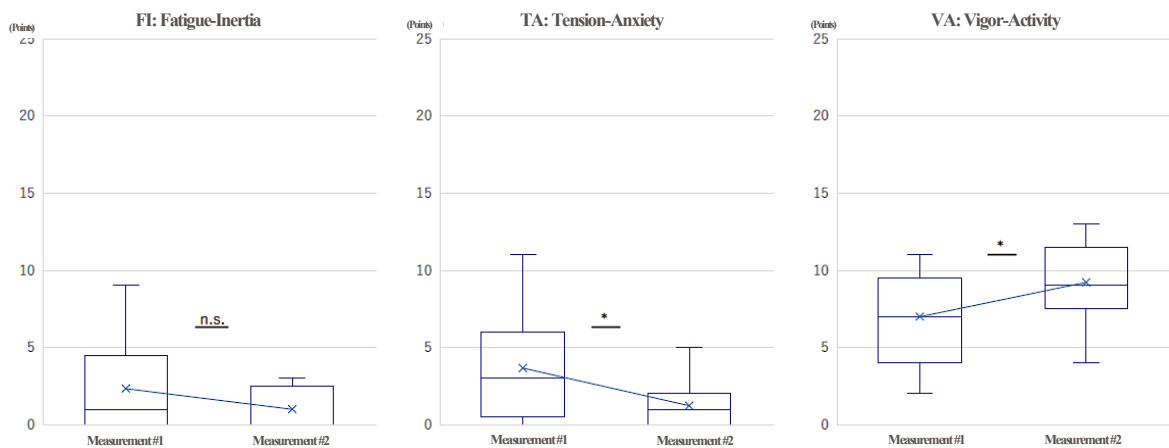


Fig. 23 Comparison of POMS measurements before and after “town walking” (2) *: $p < 0.05$, n.s.: $p > 0.05$

3.6. Results of “viewing” experiment in Exhibition Room 1 and 2 of Miyakojima City Museum

3.6.1. Comparison of physiological measurements (max. blood pressure, min. blood pressure, pulse) before and after “viewing” (Figs. 24, 25, 26)

For Exhibition Room 1, the mean value of max. (systolic) blood pressure was slightly lower after the first viewing (by 2.65 mmHg), but increased significantly after the second viewing (by 5.72 mmHg). The mean value of min. (diastolic) blood pressure increased slightly after the first viewing (by 1.15 mmHg) and increased by an even greater amount after the second viewing (by 2.72 mmHg).

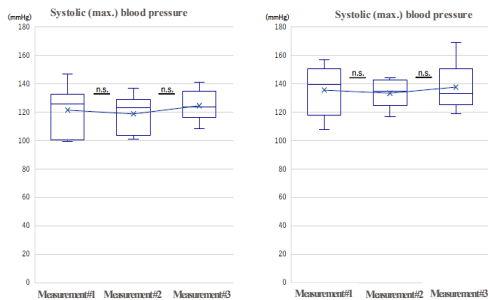
The mean pulse rate was moderately lower after both the first and second viewings, by 1.55 bpm and 2.57 bpm, respectively.

The only observed difference that was statistically significant ($p < 0.05$) was the drop in pulse rate after the second viewing.

For Exhibition Room 2, the mean value of max. (systolic) blood pressure was somewhat lower after the first viewing (by 2.16 mmHg), but significantly higher after the second viewing (by 4.25 mmHg). The mean value of min. (diastolic) blood pressure increased slightly both after the first viewing (by 0.67 mmHg) and second viewing (by 0.67 mmHg).

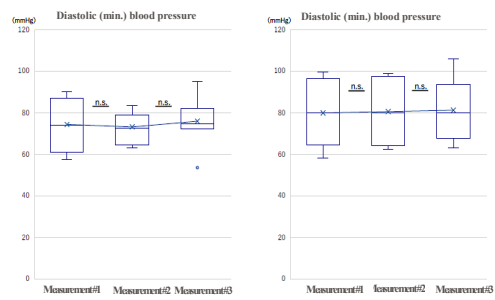
The mean pulse rate was slightly lower after the first viewing and somewhat lower after the second viewing, by 0.67 bpm and 1.99 bpm, respectively.

The only observed difference that was statistically significant ($p < 0.05$) was the drop in pulse rate after the second viewing.



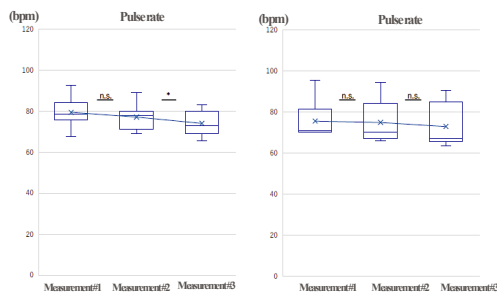
Exhibition Room 1 Exhibition Room 2

Fig. 24: Comparison of max. blood pressure before and after “viewing” n.s.: $p > 0.05$



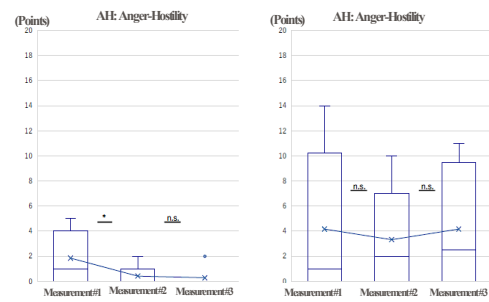
Exhibition Room 1 Exhibition Room 2

Fig. 25 Comparison of min. blood pressure before and after “viewing” n.s.: $p > 0.05$



Exhibition Room 1 Exhibition Room 2

Fig. 26 Comparison of pulse before and after “viewing” *: $p < 0.05$, n.s.: $p > 0.05$



Exhibition Room 1 Exhibition Room 2

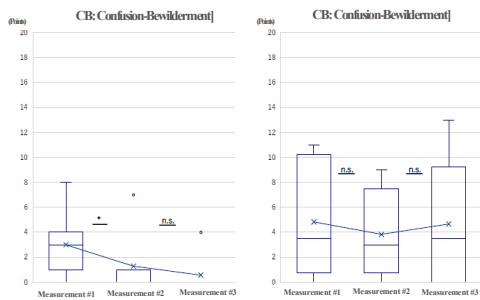
Fig. 27 Comparison of POMS Anger-Hostility before and after “viewing” *: $p < 0.05$, n.s.: $p > 0.05$

3.6.2. Comparison of psychological measurements (POMS) before and after “viewing” (Figs. 27-32)

The results of the POMS measurements for Exhibition Room 1 show that Anger-Hostility (Fig. 27) decreased somewhat (by 1.43 points) after the first viewing and decreased slightly (by 0.14 points) after the second viewing. Confusion-Bewilderment (Fig. 28) declined a little (by 1.71 points) after the first viewing and decreased slightly (by 0.72 points) after the second viewing. Depression-Dejection (Fig. 29) decreased slightly after both the first viewing and second viewing (by 0.14 points and 0.27 points, respectively). Fatigue-Inertia (Fig. 30) decreased slightly after both the first viewing and second viewing (by 1.00 points and 1.29 points, respectively). Tension-Anxiety (Fig. 31) decreased significantly after the first viewing (by 3.57 points) and decreased slightly after the second viewing. Thus, the mean values for all the negative emotions were lower after viewing. This suggests that museum bathing in Exhibition Room 1 impacted the negative mood state of the test subjects, reducing their psychological stress.

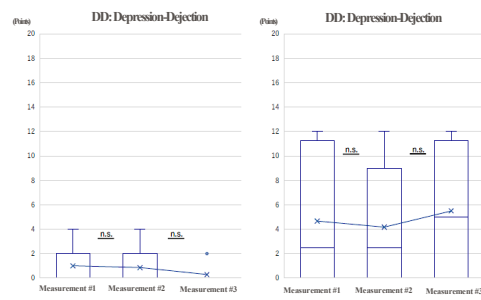
The mean value of the positive emotion Vigor-Activity (Fig. 32) increased by 1.71 points after the first viewing and by 0.57 points after the second viewing. This suggests that museum bathing in Exhibition Room 1 had an impact on the positive mood state of the test subjects.

The only observed changes that were statistically significant ($p < 0.05$) were those for Anger-Hostility (after first viewing), Confusion-Bewilderment (after first viewing), and Vigor-Activity (after the first viewing).



Exhibition Room 1 Exhibition Room 2

Fig. 28 Comparison of POMS Confusion-Bewilderment before and after viewing *: $p < 0.05$



Exhibition Room 1 Exhibition Room 2

Fig. 29 Comparison of POMS Depression-Dejection before and after viewing n.s.: $p > 0.05$

Exhibition Room 1 Exhibition Room 2

Fig. 30 Comparison of POMS Fatigue-Inertia before and after viewing n.s.: $p > 0.05$

Exhibition Room 1 Exhibition Room 2

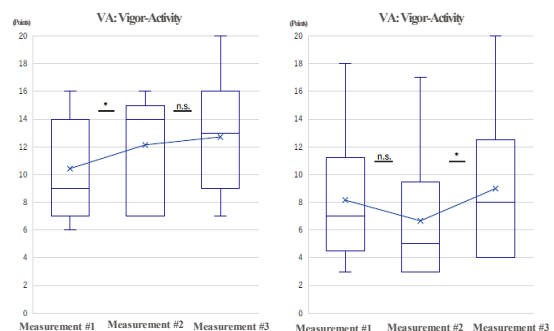
Fig. 31 Comparison of POMS Tension-Anxiety before and after viewing n.s.: $p > 0.05$

The results of the POMS measurements for Exhibition Room 2 show that Anger-Hostility (Fig. 27) decreased slightly (by 0.84 points) after the first viewing, but increased slightly (by 0.84 points) after the second viewing.

Confusion-Bewilderment (Fig. 28) decreased slightly (by 1.00 points) after the first viewing, but increased slightly (by 0.84 points) after the second viewing. Depression-Dejection (Fig. 29) decreased slightly after the first viewing (by 0.50 points), but increased slightly after the second viewing

(by 1.33 points). Fatigue-Inertia (Fig. 30) decreased slightly after the first viewing (by 1.16 points), but increased slightly after the second viewing (by 1.16 points). Tension-Anxiety (Fig. 31) decreased slightly after the first viewing (by 0.50 points), but increased slightly after the second viewing (by 1.17 points). Thus, the mean values for all the negative emotions were lower after the first viewing. This suggests that museum bathing in Exhibition Room 2 affected the negative mood state of the test subjects, by reducing their psychological stress. In contrast, the mean values of all the negative emotions were slightly higher after the second viewing. This suggests that the second viewing experience must have had some kind of psychological impact on the test subjects.

The mean value of the positive emotion Vigor-Activity (Fig. 32) decreased slightly (by 1.51 points) after the first viewing, but increased somewhat (by 2.34 points) after the second viewing. This too indicates that the museum bathing experience in Exhibition Hall 2 had some kind of psychological impact on the test subjects.



Exhibition Room 1 Exhibition Room 2

Fig. 32 Comparison of POMS Vigor-Activity before and after viewing *: $p < 0.05$

Statistically significant difference ($p < 0.05$) was observed for Vigor-Activity (after the second viewing).

4. Discussion

4.1. Comparison of physiological measurements in “viewing,” “hands-on experience” and “town walking” experiments

	Max. (systolic) blood pressure		Min. (diastolic) blood pressure		Pulse rate	
	Session 1	Session 2	Session 1	Session 2	Session 1	Session 2
Kyushu National Museum (Jan. 5, HS students)	111.33	105.58	70.08	65.58	85.42	83.67
Kyushu National Museum (Jan. 5, adults)	113.63	110.42	69.42	69.04	78.04	77.04
Kyushu National Museum (Jan. 6, HS students)	102.39	98.21	66	62.75	92.57	88.25
Koka City Hall	140.98	139.02	79.63	79.87	73.42	68.61
Minokamo City Museum	120.94	121.41	76.69	74.06	75.88	75.91
Iizuka City Historical Museum	128.89	129.11	79.06	81.89	78.94	76.17
Miyakojima City Museum (Exhibition Room 1)	121.29	118.64	74.29	73.14	79.35	77.07
Miyakojima City Museum (Exhibition Room 2)	135.33	133.17	79.83	80.5	75.53	74.91

Table 1 Comparison of physiological measurements in “viewing,” “hands-on experience,” and “town walking” experiments (gray denotes an increase compared to first measurement)

Table 1 shows a comparison of the physiological measurements taken during the “viewing” experiments (Kyushu National Museum, Minokamo City Museum, Miyakojima City Museum), “hands-on experience” experiment (Koka City Hall), and “town walking” experiment (Iizuka City Historical Museum). The mean value of the systolic (max.) blood pressure increased by 0.47 points after the “viewing” at Minokamo City Museum and by 0.22 points after the “town walking” at the Iizuka City Historical Museum, however, in every other case, the mean value of systolic blood pressure was lower after the museum bathing activity (compared to before the activity).

A comparison of the mean values of diastolic (min.) blood pressure shows a drop in pressure after the museum bathing activity in all cases, except for a 0.67-point increase at Miyakojima City Museum (Exhibition Room 2), a 0.24-point increase at Koka City Hall, and a 2.83-point increase at Iizuka City Historical Museum.

A comparison of the mean values of pulse rate shows a reduction after the activity in every case except for a very slight increase (of 0.03 points) at Minokamo City Museum.

Observing the increases and decreases in these values, Dr. Ken HASEGAWA, neurosurgeon and director of Arcadia Himi Health Center for the Elderly, commented as follows:

This is good evidence. The results of the psychological measurements and the drop in pulse rate suggest that the parasympathetic nervous system was moderately stimulated. Generally, a state of tension, in which only the

sympathetic nervous system is stimulated, will lead to an increase in blood pressure and pulse rate. Such a state could be described as a bad kind of excitement.

In contrast, when there is a good balance in the stimulation of the sympathetic and parasympathetic nervous systems, the blood pressure does not change much, resulting in a good kind of excitement, you could say.

So, we could describe the true character of the impact of museum bathing as “a healthy form of excitement.”

4.2. Comparison of psychological measurements in “viewing,” “hands-on experience” and “town walking” activities

	AH: Anger-Hostility (pts)		CB: Confusion-Bewilderment (pts)		DD: Depression-Dejection (pts)		FI: Fatigue-Inertia (pts)	
	Session 1	Session 2	Session 1	Session 2	Session 1	Session 2	Session 1	Session 2
Kyushu National Museum (Jan. 5, J&S S students)	3	0.5	5.83	2.5	2.67	1.67	5.67	2.83
Kyushu National Museum (Jan. 5, adults)	2.17	1	5.17	3	3.83	2	4.5	2.67
Kyushu National Museum (Jan. 6, J&S HS students)	0.64	0.14	3.64	1.36	2.14	0.71	6.29	2.79
Koka City Hall	1.48	0.42	2.97	1.48	2.68	1	1.74	1.06
Minokamo City Museum	3.19	2.19	3.43	2.63	3	2.5	3.81	3.06
Iizuka City Historical Museum	1.33	0.22	2.44	1	1.89	0.89	2.33	1
Miyakojima City Museum (Exhibition Room 1)	1.86	0.43	3	1.29	0.86	0.29	2.86	1.86
Miyakojima City Museum (Exhibition Room 2)	4.17	3.33	4.83	3.83	4.67	4.17	4.83	3.67

Table 2 Comparison of psychological measurements in “viewing,” “hands-on experience” and “town walking” experiments (1)

As shown in Tables 2 and 3, the mean values of all the negative POMS emotions (Anger - Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety) decreased after the “viewing” activities (Kyushu National Museum, Minokamo City Museum, Miyakojima City Museum), “hands-on experience” activity (Koka City Hall), and “town walking” activity (Iizuka City Historical Museum). This indicates that all these various museum bathing activities impacted the negative mood states of the test subjects, by reducing their psychological stress.

However, the mean value of the positive emotional state of Vigor-Activity did not increase after all the activities. In the case of the “viewings” at Kyushu National Museum (Jan. 5, junior and senior high school students, Jan. 5, adults, and Jan. 6, junior and senior high school students) and at Minokamo City Museum, the mean values of Vigor-Activity were essentially unchanged. In the case of Miyakojima City Museum (Exhibition Room 2) it even declined. The relationship between the viewing environment and the kinds of materials viewed is a topic that needs to be investigated in a subsequent study. For example, perhaps this unexpected result had something to do with the

viewing of antiquities (Kyushu National Museum and Minokamo City Museum) and historical and archaeological materials (Kyushu National Museum and Miyakojima City Museum (Exhibition Room 2)) in subdued lighting and eerily quiet settings.

	TA: Tension-Anxiety (pts)		VA: Vigor-Activity (pts)		TMD: Total Mood Disturbance (pts)	
	Session 1	Session 2	Session 1	Session 2	Session 1	Session 2
Kyushu National Museum (Jan. 5, HS students)	6.67	2	8.5	7.83	13.67	2.33
Kyushu National Museum (Jan. 5, adults)	7.17	3.75	8.42	8.25	13.58	4.25
Kyushu National Museum (Jan. 6, HS students)	4.36	1.43	8	7.93	9.07	-1.5
Koka City Hall	3.71	1.9	10.32	12.13	2.26	-6.32
Minokamo City Museum	5.56	4.44	10.19	10.06	7.68	4.31
Iizuka City Historical Museum	3.67	1.22	7	9.22	4.67	-4.89
Miyakojima City Museum (Exhibition Room 1)	5.14	1.57	10.43	12.14	3.43	-6
Miyakojima City Museum (Exhibition Room 2)	4.83	4.33	8.17	6.67	15.17	12.67

Table 3 Comparison of psychological measurements in “viewing,” “hands-on experience” and “town walking” experiments (2)

Incidentally, I used the POMS index Total Mood Disturbance (TMD) as a measure of general mood state. Profile of Mood States (POMS) was developed based on the theory that mood, as a psychological stress response, can be broken down into six subcategories—Anger-hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, Tension-Anxiety, and Vigor-Activity. TMD was conceived as a general indicator of mood disturbance, emotional or psychological distress, and subjective well-being. It expresses the overall negative mood state. TMD is calculated by summing the point scores of all the six POMS factors. The lower the score, the better the mood and emotional state.

As Table 3 shows, in all of the museum bathing experiments—“viewing” (Kyushu National Museum, Minokamo City Museum, Miyakojima City Museum), “hands-on experience” (Koka City Hall), and “town walking” (Iizuka City Historical Museum)— the mean value of TMD decreased as a result of the museum bathing activity. This suggests that museum bathing, in all its forms— “viewing,” “hands-on experience,” and “town walking”— had a real impact on the negative mood states of the test subjects, reducing their psychological stress.

4.3. Comparison of present results with “study limits” raised in international literature

Here, I would like to explain the study limitations raised by each researcher that I discussed in my earlier research note (see Footnote 4), “Prospects for Furthering the Study of Museum bathing: A Review of the International Literature Based on a Scoping Review by Law et al.” and how I kept these in mind in designing the current study, making use of new literature to compare the results I have obtained.

(1) Francesca Ferroni et al.¹⁵ of the University of Parma, Italy, pointed out that the number of works viewed at the exhibition at the Castello di Rivoli Museum of Contemporary Art near Turin was small (only two).

In the experiments conducted for this study, the Kyushu National Museum and the Minokamo City Museum, where the museum bathing activity was “viewing,” the number of items selected for viewing were 131 and 45, respectively. (The number of items viewed at Miyakojima City Museum is unknown).

In my previous museum bathing study (see Footnote 5) with junior and senior high school students, the number of viewed items were 92 at the Fukuoka Asian Art Museum, approximately 100 at the Fukuoka City Museum, 245 at the Kyushu National Museum, and 162 at the Fukuoka Art Museum. Furthermore, in my experiments with museum curators and staff (see Footnote 6), the number of items viewed was 500 at the Mifune Dinosaur Museum and 276 at the Togitsu Folk Museum.

Thus, although the number of items ranged widely, from 45 to 500, viewing was found to result in a reduction in negative mood states and a relaxation effect in all cases, as indicated by the TMD: Total Mood Disturbance measured by POMS. It is logical to suppose that increasing the number of viewed items beyond a certain point would lead to reduced concentration and increased fatigue. However, the results of the current study indicate that when viewing times are divided into sessions of 10 minutes, 20 minutes, or 30 minutes, this does not result in fatigue in the first viewing.

On the other hand, the mean values of the negative emotions Anger-Hostility, Confusion-Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety all increased slightly after the second viewing in Exhibition Room 2 at Miyakojima City Museum. This second viewing took place after the test subjects listened to an explanation about a ceiling painting titled “Vortex” (while lying on a couch or a tatami mat floor). The curator also gave the test subjects the titles of two pieces in each exhibition room, asking them to go and find them. Comparing the titles, those in Exhibition Room 1 were quite straightforward (“Miyako *jofu*” and “Poll Tax”), making the items relatively easy to find.

However, the title of one of the items in Exhibition Room 2 (“Typhoon Disasters”) was more abstract, so each of the test subjects needed to wander the room to find the item. Doubts and hesitation, wondering “Which one is it?” or “Is it this one?” may have led to some confusion and other negative emotions reflected in the results values.

Furthermore, learning about the history of heavy taxes imposed on the islanders (payable in millet and Miyako *jofu* hemp cloth) and the extreme weather events that devastated the Miyako Islands may have led the test subjects to some harsh realizations, along the lines of “I thought Miyako *jofu* was a beautiful local specialty; I didn’t realize there was such a dark side to it.” Or, “Wow! What a tragedy that a typhoon cost the lives of nearly 50 islanders!” It could also be that

¹⁵ Francesca Ferroni, Martina Ardizzi, Anna Kolesnikov, Vittorio Gallese (2018), “Behavioral and autonomic responses to real and digital reproductions of works of art,” *Progress in Brain Research*, January 2018

the test subjects felt a little puzzled lying down on a couch or on the tatami floor to listen to the explanation, thinking, “Is it OK to do this in a museum?” And perhaps there were fewer panels (with text) and less text to read in Exhibition Room 2 (compared to Exhibition Room 1), leaving the test subjects in this room feeling bored, thinking, “I already read this before.” The POMS measurements may have reflected these kinds of emotional reactions. It may also be significant that most of the test subjects in this experiment were “museum beginners.” Therefore, the fact that there were no chairs in the exhibition rooms and that the test subjects spent over 90 minutes engaged in the experiment may have contributed to their fatigue. In the future, these multiple factors will need to be taken into consideration.

(2) Some issues for further investigation regarding the establishment of a control group also became evident. US researcher Kristina Ter-Kazarian¹⁶ reported on the lack of a control group in an experiment at the Bellevue Arts Museum in Seattle, Washington, speculating that a group that did not leave the workplace during lunch break could serve as a control group in a future study. A. Feketel et al.¹⁷ of the University of Vienna, Austria, pointed out that unlike laboratory experiments, the results of the museum experiments described by Mikaela Law et al. (Footnote 8) are likely to be affected by variations due to the exhibition environments of individual museums. However, any empirical research on museum bathing in museums and art galleries will be subject to such environmental difference, so it is necessary to consider the differences as a premise. Accordingly, I think it is important to try and unify research methods, experimental procedures, etc., addressing the six questions raised by Mikaela Law et al.

In this study, in addition to “viewing,” I studied two other museum bathing activities for the first time—“hands-on experience” and “town walking.” In the “hands-on experience” experiment, six groups of test subjects looked at, touched, and talked about various folk artifacts with each other. In a future study, I would like to try and set up a control group that just silently touches the artifacts or that wears blindfolds and touches the artifacts without looking at them. For this, I would like to refer to Chatterjee. H et al.,¹⁸ who conducted a “hands-on experience” experiment with inpatients at a hospital (32 experiments from May to July 2008, using various methods of touching, including rubbing, handling carefully, and touching artworks without looking at them. They found that this kind of touching stimulated deeper reminiscence through the artworks in the test subjects, thereby enhancing their well-being.

The “town walking” experiment was held in winter (January 29, 5°C, 60% RH, for approx. 1 hour from 2:00 pm). Each of the two groups of test subjects were asked to walk together (3 km

¹⁶ Kristina Ter-Kazarian (2021), “Influence of an Art Museum Visit on Individuals’ Psychological and Physiological Indicators of Stress,” https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/45657/TerKazarian_washington_02500_21485.pdf

¹⁷ A. Feketel, R.M Moidhofl, E. Specker, U.M. Nater, H. Leder (2022), “Does art reduce pain and stress? A registered report protocol of investigating autonomic and endocrine markers of music, visual art, and multimodal aesthetic experience,” <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0266545>

¹⁸ Chatterjee. H, Vreeland. S, Noble. G (2009), “Museopathy: Exploring the Healing Potential of Handling Museum Objects,” <https://journals.le.ac.uk/ojs1/index.php/mas/article/view/145>

course) looking for seven spots corresponding to old photos. In a subsequent study, I would like to try various controls, such as setting up a group that walks 3 km in silence, or add a 5 km course, and running the experiment in a season other than winter, in spring, summer, or autumn. For this kind of research task, I would like to refer to two previous studies aimed at demonstrating the psychological impact of walking, “Forest Botanical Garden Walk: 3 km, 1 hour course”¹⁹ and “Nature Observation Program and Health Program Collaboration: Walking and Health.”²⁰

(3) The question of whether museum bathing can contribute to solving the so-called “2025 problem” and “2042 problem,” especially by helping to reduce healthcare costs, is a major research challenge. A literature review conducted by Marta Šveb Dragija et al.²¹ at the Institute of Development and International Relations, Croatia addressed the following questions: 1) Can museums enhance the psychological well-being of the people who visit them? 2) How can museum experiences be designed for enhancing the psychological well-being of visitors, and how can that well-being be measured? In this context, I would like to focus on policy development based on the “well-being economics” pursued by the New Zealand and Scotland governments, under which museums are assessed not only according to visitor numbers and income, but also on the quality of learning and psychological transformation of visitors, in accordance with the approach reported by Natalie Lawler et al.²²

5. Conclusion

In this study, I expanded the geographical area of my experiments from the Kyushu region (including Fukuoka, Nagasaki, Kumamoto, and Kagoshima), to other parts of Japan such as Shiga, Gifu, and Okinawa prefectures. The range of test subjects were broadened to local residents aged 10s to 80s. They were asked not only to view historical, archaeological, folk, fine art, and natural history materials individually, but also to touch and discuss their reflections of artifacts in groups, and to stroll through historical townscapes to evaluate the impact of museum bathing on psychological and physiological relaxation. The experiments reported here were conducted at six locations—Kyushu National Museum, Koka City Hall, Minokamo City Museum, Iizuka City Historical Museum, and Miyakojima City Museum—with a total of 101 test subjects.

The key findings of the experiments were: (1) The results of physiological (pulse) and psychological (POMS) measurements conducted before and after the museum bathing activities of “viewing,” “hands-on experience,” and “town walking” suggest that all these activities are

¹⁹ Tomoyo Mitsui (2011), “Stress-reducing effect of forest walking in the forest botanical park,” *Japanese Journal of Psychosomatic Medicine*, 51-4, 345-348

²⁰ Misato Shito (2017), “Influence of participation in nature observation meetings on participant’s health consciousness,” *Journal of the Japanese Society of Revegetation Technology*, 43-1, 267-270

²¹ Marta Šveb Dragija, Daniela Angelina Jelinčić (2022), “Can Museums Help Visitors Thrive? Review of Studies on Psychological Wellbeing in Museums,” <https://www.mdpi.com/2076-328X/12/11/458>

²² Natalie Lawler, Ambre Tissot (2021), “Preserving the intangible and immeasurable: exploring wellbeing frameworks in the museum context,” <https://www.tandfonline.com/doi/abs/10.1080/19455224.2021.1969973>

effective at promoting relaxation. Although there were some fluctuations in results, the measured changes are within a range that indicates a state of improved balance of sympathetic and parasympathetic nervous systems.

(2) The results suggest that all three of the surveyed museum bathing activities—“viewing,” “hands-on experience,” and “town walking”—can reduce the negative POMS mood states of Anger-Hostility, Confusion- Bewilderment, Depression-Dejection, Fatigue-Inertia, and Tension-Anxiety.

(3) The measured value of the positive POMS mood Vigor-Activity changed after each museum bathing activity. There was an observed increase in Vigor-Activity after each of the three kinds of museum bathing activities—after “viewing” (at Miyakojima City Museum, Exhibition Room 1), after “hands-on experience,” and “town walking.” However, the measured level of Vigor-Activity decreased after “viewing” in one case (Miyakojima City Museum, Exhibition Room 2), and remained essentially unchanged after “viewing” in two other cases (at Kyushu National Museum and Minokamo City Museum). The two cases in which Vigor-Activity was practically unchanged both involved the viewing of antiquities, and historical and archaeological materials. A similar trend was observed in a previous experiment, involving the viewing of antiquities at Fukuoka City Museum of Art (Footnote 3). The possibility that there may be a connection between this unexpected result with Vigor-Activity and the type of materials and artifacts that are viewed needs to be investigated further.

(4) The results of this study suggest that the museum bathing activities of “viewing,” “hands-on experience,” and “town walking” can effectively lower the value of the POMS indicator Total Mood Disturbance (TMD), a measure of general mood (the lower the value, the better the mood).

(5) The study limitations in this field raised in international literatures were each addressed in this research, including suggestions about how to overcome them.

As shown above, this study on museum bathing, which features an unprecedented variety of experiments, involving “viewing,” “hands-on experience,” and “town walking,” has yielded significant scientific evidence in the form of quantitative evaluations of the impact of museum bathing on physiological and psychological relaxation.

Looking ahead, I see a need to accumulate more data on groups of test subjects with more diverse attributes. It would also be interesting to examine the impact of opportunities for contact with local museums in daily life, as well as the impact of museum experiences in early childhood and in school-age children. It will also be necessary to examine more practical aspects of museum bathing, such as optimal frequency and duration of visits, and combination with physical exercise, as well as to investigate the differences in physiological and psychological effects due to the above experiences and preferences.

With these aims in mind, I plan to conduct more museum bathing experiments, in collaboration with museums around Japan. In doing so, I hope to contribute to the formulation of effective mental health measures for the benefit of many people.

Acknowledgements

This research was made possible thanks to the support of a Grant-in-Aid for Scientific Research (C) (FY2022) (Project No. 21K01004) and the Agency for Cultural Affairs “Program for Promoting Arts and Culture at Universities” (FY2022).

I would like to express my sincere appreciation to all the following people for their cooperation in the organization and management of this experiment at different venues: Kimiko YOSHIDA, Jun NAKAGOME, Joji MITO, and Kayo FUKUMA at Kyushu Sangyo University Museum of Art; Koichi INOUE at Fukuoka Women’s Junior College; Mitsuhiro UENO at Kyushu National Museum; Maki RYUOH and Naoshi ISAKA at Yamauchi Eco Club, Koka City; Fumie KOMAI and Masaharu SANO at the History and Cultural Properties Section, Koka City Office; Mitsuo KANI at Minokamo City Museum; Shintaro NAKAMURA at Iizuka City Historical Museum; and Fumika YONAHA at Miyakojima City Museum.

I am also very grateful to Dr. Ken HASEGAWA (neurosurgeon and director of Arcadia Himi Health Center for the Elderly) for his assessment of the data collected from my museum bathing experiments.

Finally, I would like to express my deep thanks to all the research partners who participated in the museum bathing experiments as test subjects, or helped in other ways.