

Verification of the Relaxation Effect of ‘Museum Bathing’: Toward a New Role for Museums in a Super-Aging Society

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Abstract: Museums are said to be spaces of “intellectual stimulation, learning, and amusement.” In the Basic Plan on the Promotion of Culture and the Arts set by Japan’s Cabinet in March 2018, museums were called upon “to serve as sites for the solution of various social problems in collaboration with related organizations such as educational institutions, welfare institutions, and medical institutions.” In this paper, I examine a new role for museums in keeping with the theme of “museums and the promotion of healthy old age” in light of Japan’s situation as a country, with its so-called “2025 Problem” and “2042 Problem,” that is rushing headlong into a super-aged society. Therefore, based on studies of the “health impact of culture and the arts” in the West and research into “forest bathing” in Japan, I am conducting empirical research on relaxation effects at museums by means of psychological and physiological measurements. My intention is to propose a pastime called “museum bathing” that seeks to promote health and prevent illness, one that envisions a new role for museums (spaces for social prescriptions) with a view toward the super-aging society.

1. Thinking about the role of local museums

1.1. Intellectual stimulation, learning, amusement, and more?

A study published in May 2020 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) investigating “how museums were affected” by the spread of the global coronavirus (COVID-19) pandemic reported that roughly 90% of the estimated 95,000 museums around the world had been temporarily closed, with 13% at risk of permanent closure.¹

In this regard, according to the 2018 Social Education Survey conducted by Japan’s Ministry of Education, Culture, Sports, Science and Technology (MEXT),² the number of museums and museum-like facilities in Japan was 5,738. Breaking this number down by type, this accounted for 3,328 history museums, 1,069 art museums, 472 comprehensive museums, 454 science museums, 112 botanical gardens, 93 zoological gardens, and 81 aquariums. Historical museums, which exhibit local cultural properties, feature prominently here.

In the past, museums have been said to be places that people visit for the purpose of “intellectual stimulation, learning, and amusement,” to explore their collections with all five senses.

However, in Japan, after the first wave of the declared state of emergency was lifted on May 25 (after having been declared in seven prefectures on April 7, 2020, and expanded nationwide on April 16), aside from allowing access to their exhibits after making visitors disinfect their hands, take their temperature, and record their details upon entry, museums for the most part elected to ignore intellectual stimulation. In particular, “hands-on” exhibition features were suspended completely.

Reports by Japan’s Ministry of Health, Labour and Welfare (MHLW)³ and the World Health Organization (WHO) indicate that this is because the virus remains transmissible for 72 hours on plastic and stainless steel and 24 hours on cardboard. Meanwhile, some museums have undertaken

¹ UNESCO. ‘COVID-19: UNESCO and ICOM concerned about the situation faced by the world’s museums.’ Published online 2020.5.18 (Retrieved from <https://en.unesco.org/news/covid-19-unesco-and-icom-concerned-about-situation-faced-worlds-museums>)

² MEXT (2020). *Shakai kyōiku chōsa. Heisei 30-nendo kekka no gaiyō* [Social Education Survey: Summary of Results for FY2018]. March 23, 2020.

³ MHLW Health and Welfare Bureau for the Elderly. ‘Kaigo shisetsu jigyōsho ni okeru shingata koronairusu kansen-shō hassei-ji no gyōmu keizoku gaidorain [Guidelines for business continuity in the event COVID-19 outbreaks in nursing care facilities/providers].’ December 2020. (Retrieved from <https://www.mhlw.go.jp/content/000749533.pdf>)

initiatives to provide each visitor with a pair of disposable rubber gloves upon their arrival, which allow them to safely “touch” objects and touchscreens indirectly, but such measures appear far removed from museums that can be enjoyed by all five senses.

According to the MEXT Social Education Survey mentioned above, museums in Japan were visited by citizens 1.1 times per capita in 2017 and museum-like facilities 1.3 times per capita. While it arguably makes little sense to pursue numbers alone, it is inevitable that the number of recorded visits for 2020 will drop precipitously.

Will there ever be a return to museums as places that people visit for “intellectual stimulation, learning, and amusement” and to explore their collections with all of their senses? What are the prospects for museums in the age of COVID-19 and beyond? At this juncture, it seems fair to say that we have been given time to consider what roles local museums can play in local communities.

1.2. Do museums overlap with welfare institutions or medical institutions?

The report “1st Basic Plan on the Promotion of Culture and the Arts” issued by the Council for Cultural Affairs (2018) recommended “museums, art museums, libraries, and similar facilities serve in a wide range of roles, including as bases not only for the preservation, transmission, creation, exchange, and dissemination of culture and the arts, but also for local lifelong learning activities, international exchange activities, volunteer activities, and tourism. Moreover, they should also seek to play a role as venues for solving various social problems through collaborations with educational institutions, welfare organizations, medical care organizations and other concerned bodies.”⁴

What I would like to focus on here is the fact that museums play a role as “venues for solving various social problems through collaborations with educational institutions, welfare organizations, medical care organizations and other concerned bodies.”

With regard to collaborations between museums and educational institutions (*hakugaku renkei* in Japanese), many such initiatives have been undertaken in the past, for example in line with the MEXT injunction to “make use of and collaborate with facilities such as local art museums as appropriate to the actual conditions of the children and the school.”⁵

However, there have been few examples of collaborations being undertaken between museums and welfare institutions or medical institutions.⁶ However, since 2018, a Canadian medical practitioners’ association has begun efforts to “write prescriptions” for visits to art museums as a part of holistic therapy to promote patient recovery.⁷ The Musée des beaux-arts de Montréal (Montreal Museum of Fine Arts; MMFA) and Médecins francophones du Canada are working together so that patients with various physical and mental health problems and their family members will be able to gain free admission to the museum in order to enjoy the health benefits of art and culture. The volume of dopamine, known as a “pleasure hormone,” secreted is equivalent to that produced when exercising the body, and has been found to be useful for alleviating conditions such as chronic pain, depressive symptoms, stress, and anxiety.

But what does it even mean to prescribe a “museum” in place of pharmaceuticals that suit the

⁴ Council for Cultural Affairs (2018). *Bunka geijutsu suishin kihon keikaku: Bunka geijutsu no ‘tayōna kachi’ o ikashite, mirai o tsukuru (dai 1-ki)* [1st Basic Plan on the Promotion of Culture and the Arts: Create the future by making full use of the diverse values of culture and the arts]. Cabinet decision, March 6, 2018.

⁵ MEXT (2017). *Shōgakkō gakushū shidō yōryō (Heisei 29-nendo kokuji) kaisetsu zuga kōsaku-kahen* [Commentary on Elementary School Curriculum Guidelines (2017 Notification) Drawing and Handicrafts Edition]. July 2017.

⁶ A Japanese example is that of the Menard Art Museum in 2001. (See <https://museum.menard.co.jp/english/outline/healing.html>)

⁷ Daniel Grant (2018). Can Going to a Museum Help Your Heart Condition? In a New Trial, Doctors Are Prescribing Art. [Retrieved from <https://observer.com/2018/11/doctors-prescribe-art-montreal-heart-condition-asthma-cancer/>]

patients' symptoms?

2. Familiarity with the current state of the aging society

2.1. Closing the gap between average life expectancy and healthy life expectancy

In the Japanese case, I would like to focus on the relevance to national medical expenditures and, by extension, social security expenditures.

This is because it has been said that whereas 9 workers supported each individual elderly person in 1965, this will decline to 2 in 2025, and only 1 in 2050; that is to say, Japan is rushing headlong from a “crowd-surfing”-style society, to a “knights and horses”-style society (after a game in which one teammate rides atop the backs of three fellow players) to a “piggyback”-style society.

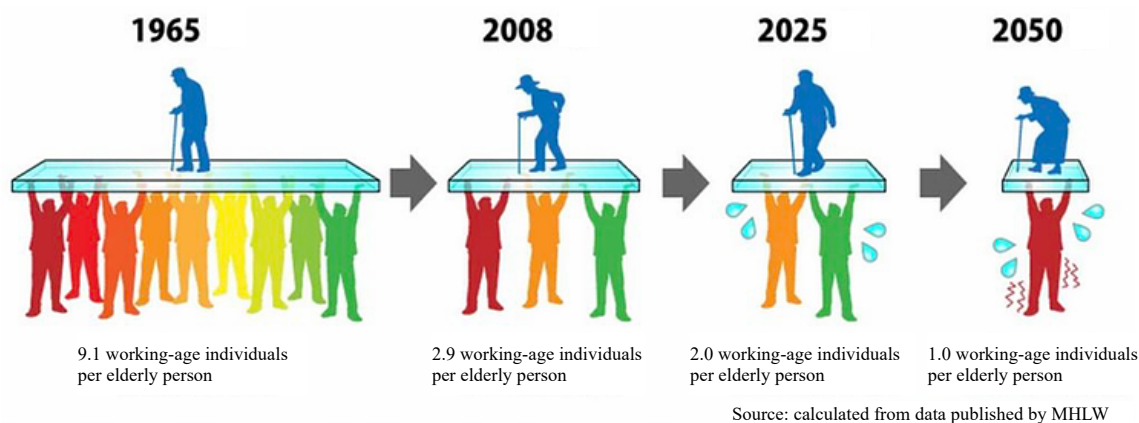


Figure 1: Relationship of the working-age population to individual elderly persons from 1965 through 2050 (Source: “The 2050 Problem,” International Society for Traditional Chinese Medicine)

According to MHLW statistics,⁸ national medical expenditures for 2018 amounted to 43.39 trillion JPY, which represented an increase of 323.9 billion JPY or 0.8% over the previous year’s total of 43.07 trillion JPY. Moreover, per capita national medical expenditures have risen to 343,200 JPY per annum, which represents an increase of 3,300 JPY (1.0%) relative to the previous year’s value of 339,900 JPY. National medical expenditures now account for 7.91% of gross domestic product, or GDP (vs. 7.87% the previous year), and 10.73% of national income, or NI (vs. 10.74% the previous year).

In this context, national medical expenditures have been increasing year over year, relative to 272,600 JPY ten years ago, 233,900 JPY twenty years ago, and 160,100 JPY thirty years ago. Their share of national income has also been rising in equal proportion. If these values continue to rise unchecked, a national financial crisis will be inevitable.

So why are national medical expenditures continuing to grow? And is there any way to curb it? According to the Japan Surgical Association,⁹ factors contributing to the natural increase in medical expenses include (1) population growth, (2) demographic aging, (3) advances in medical science and medical care and the introduction of new technologies, and (4) changes in disease patterns and targets.

⁸ MHLW (2020). Heisei 30-nendo kokumin iryō-hi no gaikyō [Overview of 2018 National Medical Expenditures]. November 23, 2020.

⁹ Japan Surgical Association. “Matome 1) Iryō-hi wa naze fueru no deshō ka? [Summary 1: Why are medical expenditures rising?] (Retrieved from: http://www.ringe.jp/civic/medical_01.html#B)

With regard to factors (1) and (2), from the Annual Report on the Aging Society for FY2020,¹⁰ we learn that as of Oct. 1, 2019, Japan's total population was 126.17 million people, with the proportion of the population aged 65 and over (aging rate) accounting for 28.4% of the total. The overall population is projected to decline in the future, falling below 100 million by 2050, when the aging rate will have risen to 37.7%. In particular, the increasing number of elderly over the age of 75 represents a major issue.

Also, with regard to factors (3) and (4), with advances in medical care and the development of new technologies, newer and more expensive equipment is introduced. Also, when expensive drugs are used in the treatment of diseases such as lifestyle-related diseases and the so-called "Big Three" illnesses of cancer, heart disease, and cerebrovascular disease, medical expenditures will increase as a matter of course.

Furthermore, factors contributing to increasing medical expenditures that are specific to Japan include (1) abundant hospital beds and long hospital stays, (2) high drug prices and high drug usage, (3) the high price of medical materials, (4) the high frequency of tests, and (5) the high frequency of medical visits.

For these reasons, Japan is working quickly to build a comprehensive community care system that will provide housing, medical care, long-term care, preventative care, and daily life support in an integrated manner, aiming for 2025, when the so-called baby-boomers, the cohort born between 1947 and 1949 during the postwar baby boom, will be "old elderly" persons aged 75 years and older. This system will enable these citizens to continue to live the rest of their lives independently in the communities they are familiar with, even though in need of long-term care. Although this has been referred to as the "2025 Problem," given "(1) abundant hospital beds and long hospital stays" that is regarded as a factor underlying rising medical expenditures in Japan specifically, the aim is for a major shift from inpatient to home-based care. In other words, while it is of course important to break away from over-reliance on hospitals, to maintain and increase Quality of Life (QOL), and to increase average life expectancy, the extension of *healthy* life expectancy is another important requirement.

The average life expectancy figures announced by Japan's MHLW in July 2019 were 81.41 years for men and 87.45 years for women.¹¹ In contrast, it turned out that "the period during which daily life can be lived without being restricted by health problems" (i.e., healthy life expectancy) was 72.7 years for men and 75.4 years for women – in other words, about nine years shorter for men and twelve years shorter for women than their average life expectancies.

By 2050, when the average life expectancy will have continued to increase, the average life expectancy of women is expected to exceed 90 years. Looking at figures for the last ten years, the gap between average life expectancy and healthy life expectancy has tended to narrow, and it will be necessary to develop a program to extend healthy life expectancy in the context of daily life support and nursing care prevention under the comprehensive community care system.

For example, the sporting goods manufacturer Mizuno conducts healthy exercise programs for the elderly at public gymnasiums that it operates under the auspices of the Designated Manager System.¹² Other available programs include nutrition classes offered by registered dietitians at local pharmacies and long-term care facilities for the elderly that are aimed at improving nutrition

¹⁰ MHLW (2020). *Reiwa 2-nendo-ban kōrei shakai hakusho (zentai-ban) (PDF-ban)* [Annual Report on the Aging Society for FY2020 (Full text PDF edition)]

Retrieved from https://www8.cao.go.jp/kourei/whitepaper/w-2020/zenbun/pdf/1s1s_01.pdf

¹¹ MHLW (2020). *Reiwa gan-nen kan'i seimei-hyō no gaikyō* [Overview of Simplified Life Expectancy Tables for 2019]. July 31, 2020.

¹² Mizuno Corporation. *Mizuno kōrei-sha kenkō undō puroguramu* [Mizuno Health Exercise Program for the Elderly]. (Retrieved from: <https://www.mizuno.jp/facility/facility-event/lalalafit.aspx>)

and eating habits.¹³ Could such health promotion programs be offered by museums, as well?

2.2. Positioning museums as sites of frailty prevention

The preface to the Constitution of the World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”¹⁴

Elderly people generally live out their natural lives through the stages of “healthy elderly person,” “frail elderly person,” and “elderly person in need of long-term care.”

At present, “frail elderly people,” who fall between the categories of healthy and in need of long-term care are referred to as such because they are at a stage where their muscular strength and their physical and mental vitality are in decline. When seeking to prolong the healthy life expectancy of elderly people, proper interventions at this “frail” stage have been reported to restore them to a healthy condition.

What is important is to take notice and take steps toward prevention at an early stage.

So what is the secret to healthy old age? In fact, there are three. The first is calisthenics and exercise, the second is diet and nutrition, and the third is social engagement.

The programs for extending healthy life expectancy mentioned above involved elderly people visiting local gymnasiums, elderly care facilities, pharmacies, and so on. In other words, they facilitate social engagement by elderly persons.

According to the Annual Report on the Aging Society for FY2020, approximately 70% of people in their sixties and fewer than 50% of people in their seventies or older are working, volunteering, or participating in community activities (e.g., neighborhood associations or community events), hobbies, or lessons. However, when we look at social activities at the community level, more than 60% of elderly persons in their sixties or older were not particularly active. In most cases, the reasons given indicated that doing so was “physically demanding,” that there was a “lack of interest in getting involved,” or that they had “no time to spare.” Also, looking at learning formats that have been carried out in the past year, individuals in their sixties were primarily engaged in forms of learning that could all be said to be rather static and self-contained, such as “online learning,” “home-based learning activities (with texts, etc.),” or “television- or radio-based learning.” In other words, it can be seen that while many working elderly are socially active, those who are not have difficulty engaging with society.

From these facts, it can be said that the elderly in Japan lack healthy balance, and are on the cusp of falling into the “frail” category.

Of course, about 14% of people in their sixties study at museums and art museums, while about 16% of people in their seventies or older study at programs or classes in community centers, lifelong learning centers or other public facilities. Here, it seems, may be a clue as to how to avoid falling into the “frail” category.

Learning might seem like a heavy burden, but just as with the healthy exercise classes at gymnasium facilities and nutrition classes at elderly care facilities and pharmacies, which doubled as sites for daily life support in terms of exercise and nutrition for local elderly people, if it were the case that visiting museums had an effect on health, there is the possibility that these figures would rise even higher. So how could we prove this? With initiatives like those of the French-Canadian doctors to “write prescriptions for museum visits,” their efficacy was backed by objective evidence, which made the collaboration between the local doctor’s association and the MMFA possible.

So what is the state of research into the health impacts of culture and the arts? To find out, we

¹³ Okai Medical Pharmacy. Kanri eiyōshi no torikumi [Registered Dietitian Initiative]. (Retrieved from: <http://www.okai-medical.com/torikumi/kanrieiyousi.html>)

¹⁴ WHO (2006). Constitution of the World Health Organization. From *Basic Documents*, Forty-fifth edition, Supplement, October 2006 (Retrieved from: https://www.who.int/governance/eb/who_constitution_en.pdf)

will need to turn to an examination of cases from overseas research.

3. Finding evidence of the beneficial health effects of culture and the arts

3.1. Surveying the case literature from Western research

The WHO Regional Office for Europe compiled a report in November 2019 entitled “What is the evidence on the role of the arts in improving health and well-being?”¹⁵

The theme in this case was health and the arts, which broadly includes fine art, music, literature, theater, and film. While the health effects of art have been recognized to some extent, primarily in Europe, over the past twenty years, the existence of an evidential basis for this has not always been fully acknowledged. This is because most evaluations have been subjective, as with statements like “I feel soothed when I see a painting,” and “I feel invigorated when I go to concerts.”

To that end, researchers examined the medical literature pertaining to the arts, consisting of upwards of 3,000 papers published in English and Russian between January 2000 and May 2019. Based on this survey, the effects of art and other effects were divided into two categories, namely “illness prevention and health promotion” and “disease management and treatment” and classified into evidence that met certain conditions.

Included within this literature, for example, are studies showing that music has the effect of reducing high blood pressure stemming from diabetes or hypertension, and that drawing can help children deal with grief, depression, and post-traumatic stress disorder (PTSD). So by presenting the following four aspects as a logic model linking the arts with health, evidential awareness and improved quality were fostered for future empirical research.

- (1) Psychological aspects (e.g., improved sense of self-efficacy, coping, and emotional regulation)
- (2) Physiological aspects (e.g., lower stress hormone response, enhanced immune function, enhanced cardiovascular reactivity)
- (3) Social aspects (e.g., reduced loneliness and isolation, enhanced social support, improved social behaviors)
- (4) Behavioral aspects (e.g., increased exercise, adoption of healthier behaviors, skills development)

Incidentally, a research group at University College London carried out a follow-up survey with local residents over the age of 50 for about fourteen years from 2002 for the purpose of investigating the effects of art on human beings. As a result, it was reported that those who had many opportunities to appreciate art had a significantly lower mortality rate than those who had no opportunity (Fancourt and Steptoe 2019).¹⁶

Although previous studies have examined a variety of methods, with the expectation of diverse effects on different subjects, their divergent methodologies make it difficult to apply their results to elderly people in other regions or countries.

In this study, I comprehensively analyzed the relationship with art in terms of the four aspects identified by WHO, targeting theaters, concerts, operas, art museums, art galleries, and exhibitions with survey items relating to factors such as demographics, socioeconomics, health

¹⁵ Retrieved from <https://www.euro.who.int/en/publications/abstracts/what-is-the-evidence-on-the-role-of-the-arts-in-improving-health-and-well-being-a-scoping-review-2019>

¹⁶ Daisy Fancourt and Andrew Steptoe (2019). The art of life and death: 14 year follow-up analyses of associations between arts engagement and mortality in the English Longitudinal Study of Ageing, *BMJ*2019.

status, behavioral characteristics, cognitive function, and social interaction status.

Moreover, of these four aspects, progress in the area of physiological research is most prominent, with the following findings in connection with culture and the arts and stress reduction.

Angela Clow of the University of Westminster in the UK examined cortisol levels in London office workers before and after brief visits to an art gallery over their lunch breaks. While she found relatively high values at the time of the visit, these values returned to baseline after a visit. She reported that stress would be reduced simply by looking at works of art over a brief lunch break (2006).¹⁷

A research group at the University of Bologna in Italy conducted a physiological experiment at the Sanctuary of Vicoforte (Santuario della Nativita di Maria) in the Piedmont region (the basilica, which dates back to the 16th century and features one of the largest elliptical cupolas in the world, is decorated with frescoes on its ceiling and walls including a fresco depicting a Madonna and Child). In the study, saliva samples were collected from subjects before and after they were taken on a tour of the cathedral that lasted about two hours to measure values for cortisol, an adrenal cortex hormone that serves as an indicator for stress hormones. Cortisol levels were observed to drop by a maximum of 60% over the course of the tour, and 90% of subjects reported feeling better when they came out than before they entered the sanctuary (2016).¹⁸

A research group at Roma Tre University in Italy investigated changes that took place before and after appreciation of contemporary art and representational paintings in terms of the physiological aspects of blood pressure and pulse rate. They reported a significant drop in systolic blood pressure among subjects who looked at representational paintings (2018).¹⁹

Examples of this kind of research report are also apparently spreading from Europe to the USA.²⁰

We can thus see mounting evidence in overseas research suggesting that personal experience of culture and the arts and the appreciation of works of art are effective for maintaining health and reducing stress.

However, given the difficulty of confirming details like time allocation and the timing of measurements with regard to these experimental methods, I hope to acquire hints about methods for evaluating and measuring objective effects by investigating research methods used in the context of natural therapies around the theme of “forest bathing” (*shinrin-yoku*), which is a topic of ongoing research in Japan.

3.2. Learning how to evaluate and measure effectiveness from studies of “forest bathing”

Experimental studies regarding the physiological effects of forest bathing began in the 1990s. After a brief hiatus, research resumed from 2000, making rapid progress that continues today with advances in methods for measuring brain activity and autonomic nerve activity and the development of measuring instruments.²¹

¹⁷ Angela Clow with Catherine Fredhoi (2006). Normalisation of salivary cortisol levels and self-report stress by a brief lunchtime visit to an art gallery by London City workers, *Journal of Holistic Healthcare*, 3 (2), pp. 29-32.

¹⁸ “Why art is good for your heart: People who admire Renaissance paintings ‘see stress hormone levels drop by 60 per cent,’” *Mail Online*, 22 April 2016.

¹⁹ Stefano Mastandrea, Fridanna Maricchiolo, Giuseppe Carrus (2018). Visits to figurative art museums may lower blood pressure and stress, *Art & Health* 11(2), 1-10

²⁰ Kristina Ter-Kazarian (2020). Influence of Art Museum Visit on Individuals’ Psychological and Physiological Indicators of Stress, *University of Washington*.

²¹ Miyazaki Yoshifumi (2018). *Shinrin-yoku: Kokoro to karada o iyasu shizen serapī* [Forest-bathing: A Natural Therapy that Heals the Mind and Body]. Sogensha; Miyazaki Yoshifumi, ed. (2016). *Shizen serapī no kagaku: Yobō igaku-teki kōka no kenshō to kaimei* [The Science of Natural Therapies: Verifying and Clarifying Their Prophylactic Effects]. Asakura Publishing.

Research into natural therapies seeks to clarify, based on scientific data, the relaxation that people for some reason feel when they are in contact with nature, in order to find ways to use natural therapies on the basis of their prophylactic effects.

Yoshifumi Miyazaki elaborates the concept of natural therapy with the following five-part cycle:

- 1) stress is felt → 2) exposure to a forest, flowers or other form of nature provides a calming effect→ 3) this in turn causes physiological relaxation and an improved immune function → 4) that helps prevent illness→ 5) reducing costs for medical care.

He also finds that people with high blood pressure experience a drop in blood pressure when they take a “forest bath” while those with low blood pressure experience an increase, in a kind of “physiological recalibration” that varies by individual.

To date, four broad research methods have been established for natural therapy:

- (1) Measuring brain activity with near-infrared spectroscopy or near-infrared time resolved spectroscopy to show that a heightened state of relaxation is associated with decreased activity in the prefrontal cortex.
- (2) Measuring heart rate variability, heart rate, and blood pressure to grasp autonomic nerve activity, showing that in a relaxed state parasympathetic nerve activity will increase while sympathetic nerve activity will decrease.
- (3) Measuring stress markers in saliva to show that concentrations of cortisol, amylase, and other stress hormones increase when a subject is stressed.
- (4) In a stressed state, natural killer (NK) cell activity will decrease, as does the body’s ability to suppress tumor cells and prevent infectious diseases.

Furthermore Qing Li (2020)²² writes that studies of forest bathing, which have now been ongoing for over three decades, have confirmed the following six pieces of evidence, including a relaxation effect:

- (1) Blood pressure and pulse rate are improved (autonomic nervous system)
- (2) Sleep is improved (autonomic nervous system)
- (3) Mood is improved (psychological reaction)
- (4) Amelioration of depression (psychological reaction)
- (5) Stress hormones are decreased (endocrine system)
- (6) Immunity increases (immune system)

A basic experimental method for deriving such evidence is to form a unit of between 10 and 12 people, divide them into two groups, and then have each spend time walking and sitting in the forest and the city, respectively, alternating such activity every other day. Before and after engaging in the walks with sitting and observing, they would be subjectively evaluated with the Japanese version of POMS2, VAS (a mood profile test), and a 13-level scale evaluating feelings of “pleasantness,” “calmness” and “naturalness” (Impression Evaluation Method by Space [IEMS] using the semantic differential [SD] method), followed by physiological evaluations testing for indicators such as blood pressure, pulse, salivary amylase, and cortisol.

Based on these methods of evaluating and measuring the objective effects of forest bathing, I have measured relaxation effects before and after visits to various types of museums. I would like to share the results below.

²² Li Qing (2020). *Shinrin-yoku* [Forest-Bathing]. Mamukai Books Gallery.

4. An experimental method for objectively evaluating relaxation effects before and after museum visits

4.1. Defining “museum bathing”

At museums, we often hear people say something along the lines of “When I visit a museum, I somehow feel energized” or “When I look at a painting, I somehow feel soothed.” But is this actually true? Physicians with whom I collaborated on this study said that, “What we need is not subjective evaluations saying things like, ‘Viewing the works made me feel somehow good,’ but objective evaluations and hard evidence for these things. When it comes to writing prescriptions, in Japan, the relationship with insurance scores begins to matter. Without a score, it will be difficult to introduce such an initiative into medical care in practice.”

Therefore, I decided to develop my research by adopting the term “museum bathing” to refer to activities that capitalized on the healing effects of museum to promote people’s health and prevent disease through museum visits.

4.2. Aims of the experiment

The experiment seeks to scientifically verify (with psychological and physiological measurements) relaxation effects before and after museum visits, which were conducted over twelve occasions in total at institutions specializing in the exhibition of themes such as history, art, folklore, archeology, and wildlife.

4.3. Participants

The study involved the participation of 135 healthy men and women ranging in age from their twenties to their seventies. All participants were briefed in advance about the purpose of the experiment and furthermore, on the understanding that they would not suffer any disadvantage as a result of their cooperation in the study, gave their consent to the use and publication of the resulting psychological and physiological measurements in research to be utilized in future activities. In addition, this experiment was approved by the Ethics Committee of Kyushu Sangyo University (approval no. 2020-004).

4.4. Experiment venues, dates, and tour details

The experiment was carried out over the twelve occasions listed below between September 2020 and January 2021.

- (1) Omuta City Zoo (Omuta City, Fukuoka Prefecture) / 17 participants
 - Date: Sept. 26, 2020 (Sat.)
 - Details: Guinea pig handling experience and zoo tour
- (2) Iizuka City Historical Museum (Iizuka City, Fukuoka Prefecture) / 17 participants
 - Date: Oct. 3, 2020 (Sat.)
 - Details: Tour of permanent exhibition (mostly of materials pertaining to coal mining)
- (3) Museum of Kyushu Sangyo University (Higashi Ward, Fukuoka City, Fukuoka Prefecture) / 20 participants
 - Date: Oct. 10, 2020 (Sat.)
 - Details: Individual and group (4-person) tours of the 29th Museum of Kyushu Sangyo University Collection Exhibition “Conversing with Pictures”: A Journey through Landscapes, Animals, and People, with an impromptu concert performance
- (4) Yukuhashi City Masuda Art Museum (Yukuhashi City, Fukuoka Prefecture) / 10 participants
 - Date: Dec. 13, 2020 (Sun.)
 - Details: Tour of permanent exhibition and special exhibition: “Suematsu Kenchō and the Arts”
- (5) Yukuhashi City History Museum (Yukuhashi City, Fukuoka Prefecture)
 - Date: Dec. 13, 2020 (Sun.)

- Details: Tour of special exhibition: “Baron Suematsu: An Impassioned Life: Commemorating the 100th Anniversary of the Death of Suematsu Kenchō”
- (6) Onojo Cocoro-no-furusato-kan City Museum (Onojo City, Fukuoka Prefecture) / 16 participants
 - Date: Dec. 20, 2020 (Sun.)
 - Details: Tour of permanent exhibition
- (7) Kyushu Historical Museum (Ogori City, Fukuoka Prefecture)
 - Date: Dec. 20, 2020 (Sun.)
 - Details: Tour of permanent exhibition
- (8) Kurume City Art Museum (Kurume City, Fukuoka Prefecture) / 12 participants
 - Date: Jan. 23, 2021 (Sat.)
 - Details: Tour of “Yajūrō Takashima: The 130th Anniversary of His Birth”
- (9) Dazaifu Fureai Museum (Dazaifu City, Fukuoka Prefecture)
 - Date: Jan. 23, 2021 (Sat.)
 - Details: Tour of “The 25th Lifestyle Through the Ages Exhibition”
- (10) Fukuoka Art Museum (Chuo Ward, Fukuoka City, Fukuoka Prefecture) / 11 participants
 - Date: Jan. 24, 2021 (Sun.)
 - Details: Exhibition tour: “From the Collection: Modern and Contemporary Art”
- (11) Fukuoka City Archaeological Center (Minami Ward, Fukuoka City, Fukuoka Prefecture)
 - Date: Jan. 24, 2021 (Sun.)
 - Details: Tour of the permanent galleries and storage rooms
- (12) Kyushu Railway History Museum and sites in the Mojiko Retro District like the former Moji Mitsui Club / 16 participants
 - Date: Jan. 30, 2021 (Sat.)
 - Details: Tour of the permanent exhibition and a stroll through Mojiko Retro District

4.5. Methodology

With the exception of venue (3), Museum of Kyushu Sangyo University, the experiment was implemented as in Figure 1 below.

Participants were asked to take part in the verification experiment as follows. After providing an explanation of the museum bathing experiment beforehand, I reconfirmed their willingness to be a part of the experiment. Afterward, I collected pre-experimental data by performing psychological measurements using (1) the Profile of Mood States (POMS) Questionnaire and (2) the Visual Analog Scale (VAS) as a self-evaluation of physical condition and physiological measurements using (1) a measurement of salivary amylase and (2) a measurement of blood pressure and pulse rate. The participants then spent sixty to ninety minutes taking in the exhibitions at the day’s venue, after which I performed the same psychological and physiological measurements.

At venue (3), Museum of Kyushu Sangyo University, participants underwent psychological and physiological measurements a total of four times, as follows. (1) Before the start of the experiment at 11:20 AM, (2) after individual art appreciation at 1:10 PM, (3) after joint art appreciation at 2:10 PM, and (4) after a group concert performance at 4:10 PM.

Note that smoking and drinking caffeinated beverages were prohibited during the experiment in order not to provide conditions in which stimulation might be provided by sources other than the experimental environment. Also, at venue (3), lunch was served immediately after the first measurement, and participants were given at least one hour before resuming the experiment in the afternoon.

A t-test was also performed in order to test whether the difference in average values before and after the tour constituted a statistically significant difference ($p < 0.05$).

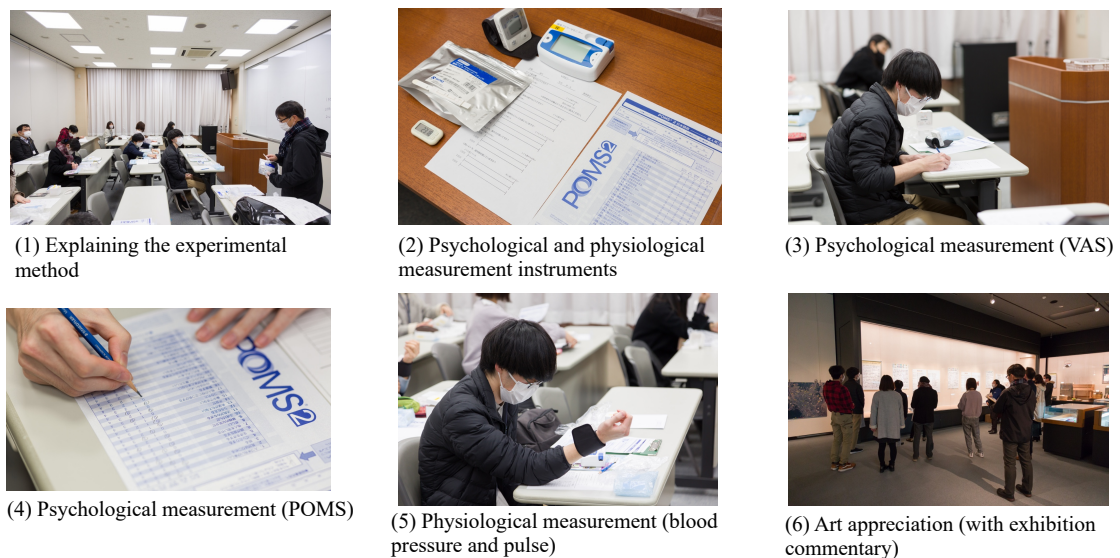


Figure 1: The course of our “museum bathing” verification experiment (from before the tour to during the tour)

4.6. Tools and methods used for psychological and physiological measurements

(1) Psychological measurement / POMS (Profile of Mood States)

Kaneko Shobo’s Japanese Translation of the Profile of Mood States Second Edition (POMS 2®) (Adult Short Form) was used to evaluate mood and emotional states. The questionnaire consists of 35 items on A4-sized sheets. The fact that the short form has only about half of the 65 items on the full-length version makes it easier on participants. This assessment measures the following seven scales, namely “Anger-Hostility,” “Confusion-Bewilderment,” “Depression-Dejection,” “Fatigue-Inertia,” “Tension-Anxiety,” “Vigor-Activity,” and “Friendliness.” Answering time is around five minutes.

(2) Psychological measurement / Self-evaluation of physical condition: VAS (Visual Analog Scale)

This questionnaire, used for the self-evaluation of physical condition, consists of 7 questions on an A4-sized sheet (concerning “Physical Condition,” “Emotional Stress,” “Concentration,” “Fatigue,” “Enjoyment,” “Anxiety,” and “Refreshment” at the time of answering), and takes about 3 minutes to answer. For example, to the question “How is your physical condition at the present time?” a respondent would indicate their answer at a position on a 10 cm line where 0 corresponds to “I couldn’t feel worse” and 100 is the “I couldn’t feel better.” In clinical practice, this type of scale is used as an indicator of pain intensity.

(3) Physiological measurement: Salivary amylase

Salivary amylase was measured using a monitor and monitor chip manufactured by Nipro Corporation.

Salivary amylase, which indicates sympathetic nerve activity, acts as a stress marker. When someone is stressed, excitement of the sympathetic nervous system is promoted through the hypothalamus in the nervous system. This excitement heightens amylase activity as an internal self-defense response to non-physical stress.

The degree of stress can be evaluated by measuring amylase activity in salivary amylase, which constitutes a non-invasive method for measuring physical response to stress. When the resulting value is high, then stress is high. If the value is low, stress is low.

Participants place the monitor chip under their tongue for about thirty seconds, whereupon measurement is conducted with the salivary amylase monitor.

(4) Physiological measurement: Wrist blood pressure monitor and pulse monitor

Systolic blood pressure, diastolic blood pressure, and pulse rate, which are indicators of autonomic nerve activity, were measured using an OMRON Blood Pressure Monitor (Wrist Type) HEM-6121. Blood pressure and pulse measurements are among the simplest methods for reflecting autonomic nervous activity.

Basically, when a living body is relaxed, blood pressure and pulse rate will decrease. When stress is applied, they will increase. In other words, a decrease indicates that parasympathetic activity is predominant, and thus a relaxed state. Conversely, an increase indicates excitement of the sympathetic nervous system, which signals a state of tension.

In addition, participants were also provided with a pedometer (Yamasa Tokei EX-200 Easy Pocket Pedometer) to measure the number of steps taken during the tour.

5. Objective evaluation during museum bathing: Results

5.1. Psychological measurement / POMS (Profile of Mood States) results

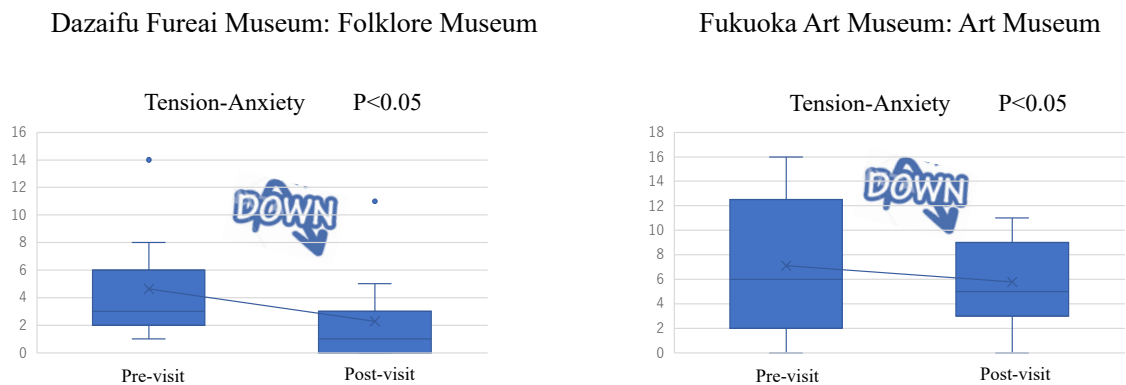


Figure 1: Changes in POMS [Tension-Anxiety] values before and after visits to a folklore museum and an art museum

Before and after visits to a folklore museum (Dazaifu Fureai Museum; average number of steps: 415) and an art museum (Fukuoka Art Museum; average number of steps: 908), it was found that both had a significant effect in terms of decreasing values for “Tension-Anxiety” ($P<0.05$) (Figure 1).

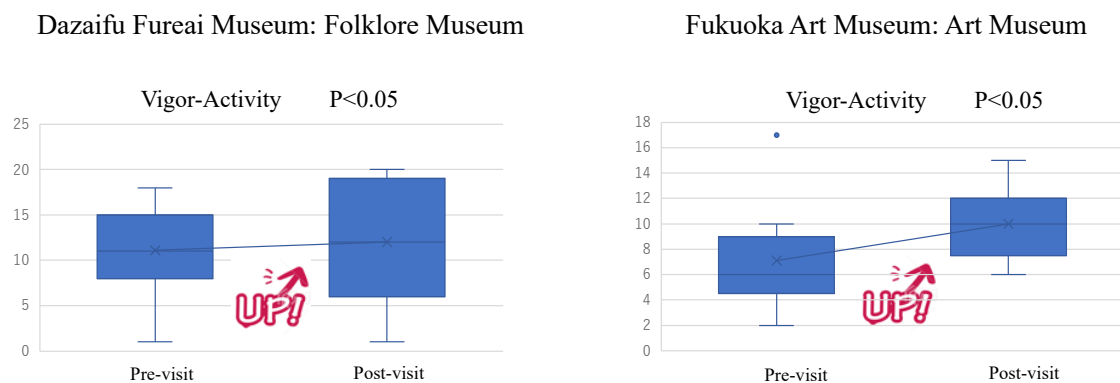


Figure 2: Changes in POMS [Vigor-Activity] values before and after visits to a folklore

museum and an art museum

In addition, before and after visits to the same museums, it was found that both had a significant effect in terms of *increasing* values for “Vigor-Activity” ($P < 0.05$) (Figure 2).

5.2. Psychological measurement / Self-evaluation of physical condition: VAS (Visual Analog Scale) results

When we look at our other psychological measurement (VAS), it was found that for answers to the question “At this time, are you feeling anxious,” visits to another art museum (Kurume City Art Museum), archaeological museum (Fukuoka City Archaeological Center), and historical museum (Kyushu Historical Museum) all had the effect of increasing scores for “I am not feeling at all anxious” before and after the visit. Note that in the case of the archaeological museum and the historical museum, no significant difference was found (Figure 3).

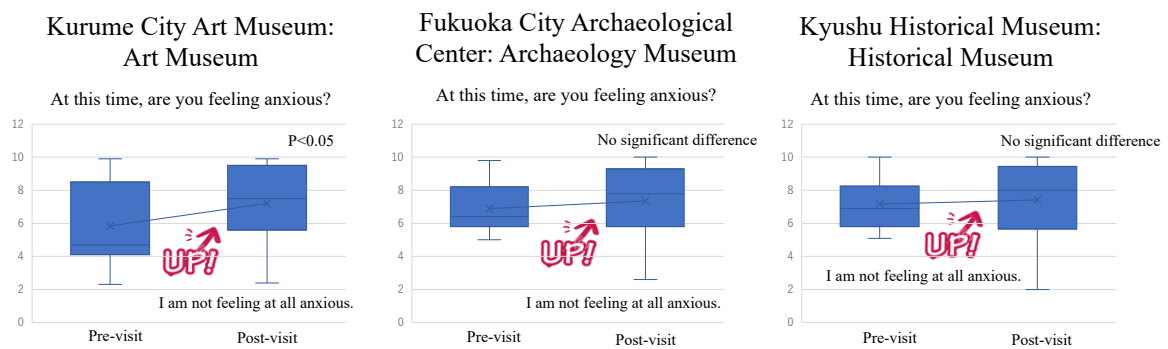


Figure 3: Changes in VAS scores for “Anxiety” before and after visiting an art museum, archeology museum, and historical museum

Also, it was found that for answers to the question “At this time, are you feeling invigorated,” visits to these same three museums all had the significant effect of increasing scores for “I’m feeling extremely invigorated” before and after the visit ($P < 0.05$) (Figure 4).

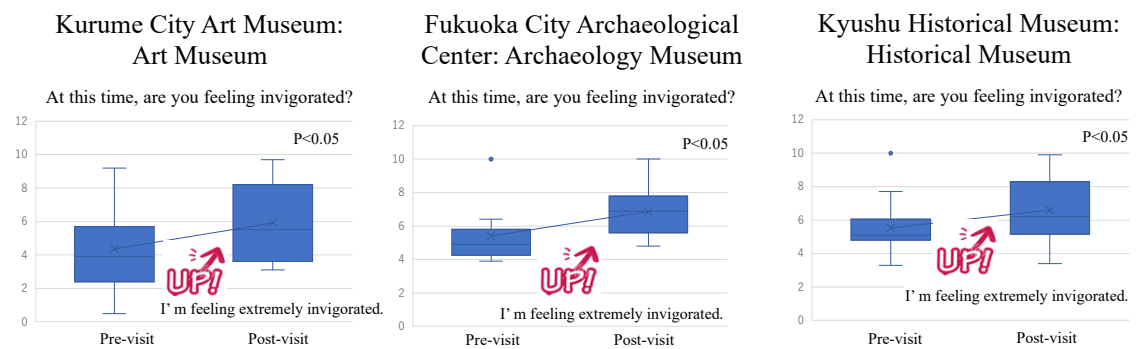


Figure 4: Changes in VAS scores for “Refreshment” before and after visiting an art museum, archeology museum, and historical museum

5.3. Physiological measurement: Salivary amylase results

While we have not yet collected much data with regard to salivary amylase, we did do so before and after art appreciation and after an impromptu musical performance at the Museum of Kyushu Sangyo University. The visit coincided with the 29th Museum of Kyushu Sangyo University Collection Exhibition, “Conversing with Pictures”: A Journey through Landscapes, Animals, and People.

Participants’ stress values were observed to decrease after individual art appreciation and then to increase after joint art appreciation in groups of about four people.

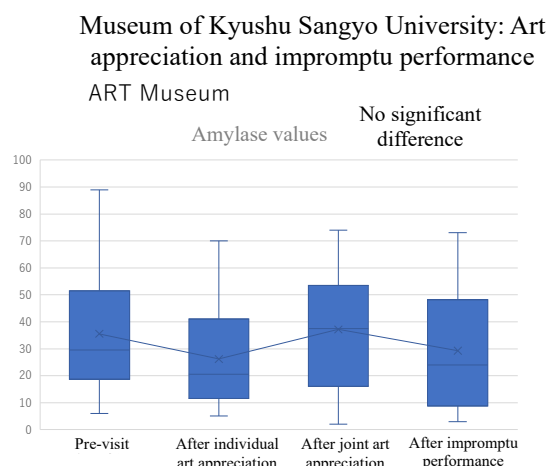


Figure 5: Changes in amylase values

Also, later, stress levels dropped again after a group discussion of participants’ impressions of the works of art and an impromptu performance. This means that while individual art appreciation at one’s own pace had a relaxation effect, appreciating art together with new acquaintances was stressful. And it seems that a relaxation effect was also prompted by a sense of openness elicited by the impromptu performance (Figure 5).

5.4. Physiological measurement: Blood pressure and pulse results

Average values for systolic blood pressure (maximum blood pressure), diastolic blood pressure (minimum blood pressure), and pulse rate showed almost no change throughout. However, for several women in their sixties and seventies who took part on several occasions, a significant decline of maximum blood pressure was observed before and after visits to a zoological garden (Omuta City Zoo), a historical museum (Iizuka City Historical Museum), another historical museum (Yukuhashi City History Museum), and an art museum (Kurume City Art Museum) (Table 1).

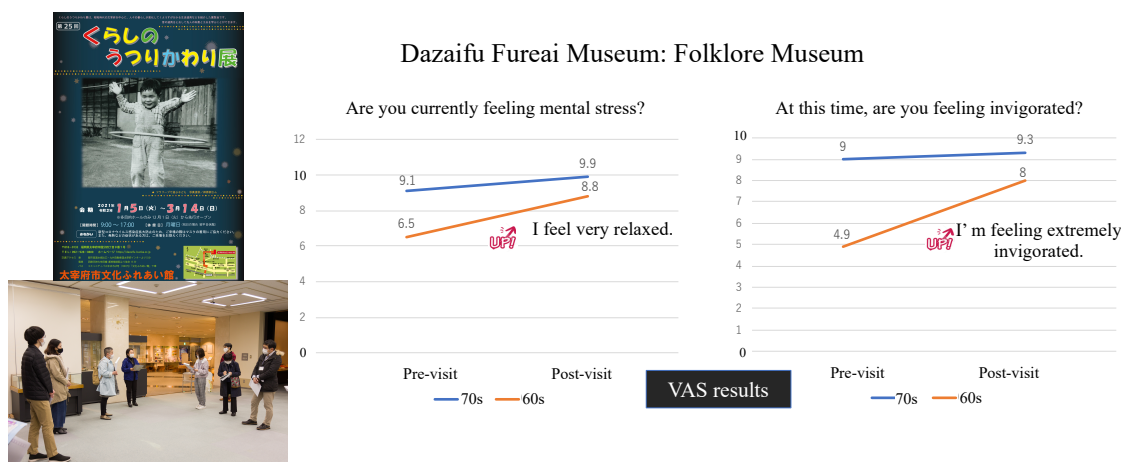
No.	Date of Visit	Venue	Museum type	Weather	High (°C)	Low (°C)	Avg. wind speed	Age	Sex	Systolic blood pressure (maximum)	
										Before visit	After visit
1	2020.9.26	Omuta City Zoo	Zoological Garden	Fine	26.7	19.5	2.9 m	70s	Female	143	135
								60s	Female	127.5	125
2	2020.10.3	Iizuka City Historical Museum	History and Folklore Museum	Cloudy	28.2	18.0	1.2 m	70s	Female	154	143
								60s	Female	144.5	137
5	2020.12.13	Yukuhashi City History Museum	History Museum	Cloudy	12.1	3.5	1.4 m	70s	Female	147.5	132.5
								60s	Female	138.5	136.5
8	2021.1.23	Kurume City Art Museum	Art Museum	Rainy	14.3	10.7	3.8 m	70s	Female	144.5	133.5
								60s	Female	145	138

Table 1: Changes in “maximum blood pressure” before and after visits among women in their 60s and 70s who participated on multiple occasions

Also, among the same women in their sixties and seventies who participated on multiple occasions, there was one instance (a folklore museum, Dazaifu Fureai Museum) when the psychological measurements and physiological measurements did not match.

At Dazaifu Fureai Museum, participants visited the “Lifestyle Through the Ages Exhibition.” Reflecting after a nostalgic tour of materials from their childhood in the 1950s and 1960s, when they grew up, they shared many stories of their experiences with other participants.

While the psychological measurements reported using the VAS show increases in their reported sense of feeling “extremely invigorated” and “very relaxed” after the tour, it was found that physiological measurements for maximum blood pressure had increased significantly after the tour, indicating a state of excitement (Table 2).



9	2021.1.24	Dazaifu Fureai Museum	Folklore Museum	Rainy	13.8°C	10.5°C	1.2 m	70s	Female	127.5	↑160.5
								60s	Female	130.5	141.5

Table 2: Changes in VAS and “maximum blood pressure” before and after visits among women in their 60s and 70s who participated on multiple occasions

6. Future prospects

In this research note, I have been able to present a study design for demonstrating with scientific data that “museum bathing” has a relaxing effect on people. However, that there is still insufficient data cannot be denied.

It was found that individual differences sometimes arose, as did mismatches between psychological measurements and physiological measurements caused by extrinsic factors such as facility type and weather as well as intrinsic factors like personality or other attributes. Since this has also been observed in the context of forest bathing,²³ in future, I would like to develop this study by conducting comparative surveys in experimental groups and control groups, for example, that will take into account various biases and individual differences.

Finally, I would like to present the following report on elderly day-care facilities that have been affected by the COVID-19 pandemic from a hospital official who acted as a research partner for this study.

“While we are somehow managing to continue providing day-care services, albeit with a daily sense of uncertainty, museum-based reminiscence therapy has been suspended since the outset. I worry that muscle deterioration and loss of motivation on the part of elderly people due to being homebound is becoming increasingly serious.” The three elements of health for elderly people are exercise, nutrition, and social participation.

²³ Morimoto Kanehisa, Miyazaki Yoshifumi, and Hirano Hideki, eds. (2006). *Shinrin igaku* [Forest Medicine]. Asakura Publishing.

Given the current state of affairs for elderly day-care services, it is crucial to provide support for the so-called “frail” class of elderly people, positioned intermediately between healthy elderly people and those who are bedridden.

As the COVID-19 pandemic continues, elderly people will continue to face difficulties going out in public. In order for museums to play a role as sites of “frailty prevention,” it will be necessary to develop programs, including “reminiscence therapy,” that envision the post-COVID era. This is another reason we must move ahead quickly with research that undertakes the scientific evaluation of **museum bathing** as an activity that capitalizes on the healing effects of museums to promote health and prevent illness through museum visits.

The social isolation of elderly people is growing increasingly serious. According to the National Institute of Population and Social Security Research, in terms of “frequency of conversation,” 14.8% of elderly single men have conversations only “once every two weeks at most” (5.4% among women). Moreover, among the items under “presence of people you can rely on,” upwards of 40% of single elderly men and women, non-elderly single men, and single-parent households replied that they had “no one to rely on” for “care and nursing (other than of children).”²⁴

In light of these circumstances, with a view to confronting the 2025 Problem and 2042 Problem, university-based researchers, medical care and welfare institutions, and local governments must come together to consider not only sites of medical prescription for elderly people, as shown in Figure 6, but also museums, which have an additional function as “health stations” that serve as “sites of social prescription” for the elderly.

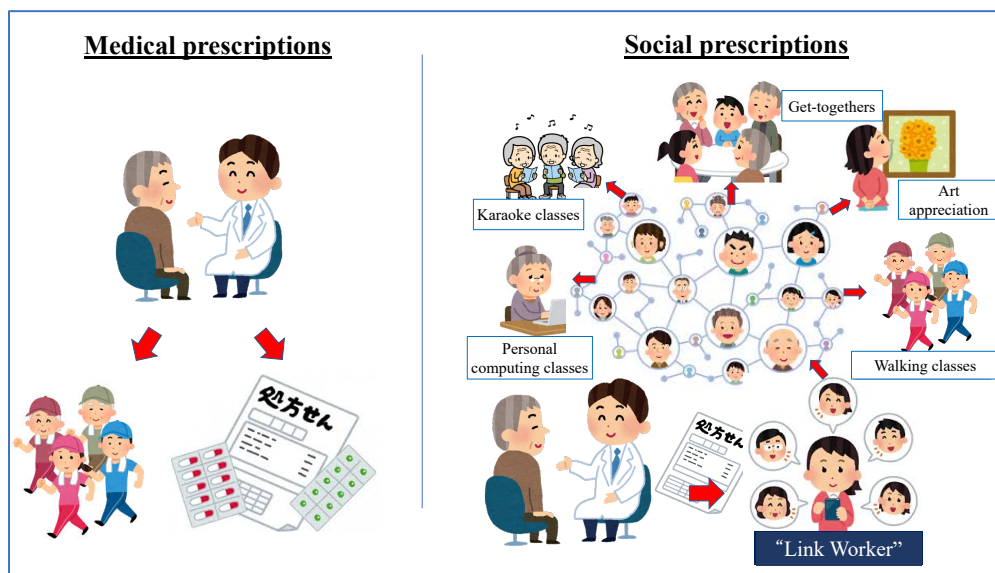


Figure 6: Comparing medical prescriptions and social prescriptions

²⁴ National Institute of Population and Social Security Research (2017). *Shakai hoshō jinkō mondai kihon chōsa seikatsu to sasae ai ni kan suru chōsa no gaiyō* [Annual Population and Social Security Surveys: Outline of the National Survey on Social Security and People’s Life].

Acknowledgements

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