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Effects of Coastal Nature Experience on Human Well-being (海域経験が人間のポジティブ状態形成に及ぼす影響)

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Doctoral Dissertation

Effects of Coastal Nature Experience on Human Well-being

(海域経験が人間のポジティブ状態形成に及ぼす影響)

January 2016

Graduate School of Maritime Sciences, Kobe University

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(彭 臣晨)
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Chapter 1

Introduction

1.1 Background

The Earth nurtures, and humans live on Earth as a result of environmental adaptation of physiological and psychological functions. Human beings are a product of nature, a part of nature. Earth is the one and the only home of humans and as far as we know the only place they have developed in the universe. Evolution of the Earth’s surface environment, including the variety of gas molecules in the air humans interact with are at the foundation of life. Both human existence and evolution of the Earth’s surface environment have undergone significant changes. All in all, in the continuous development and evolution of the Earth’s surface environment over eons, the Earth’s environment and humans have established a close relationship. The surface of the Earth is the region of human social development, and the development of science and technology. Human activities have now reached far beyond the land and sea surfaces, reaching altitudes beyond Earth, and even into space, but the earth’s surface still remains the basic environment of human activity.

Ecology is a unique branch of biology, the general science that studies living organisms and their relationship to the environment. Relationships between organisms and the environment are mutually reinforcing, in an ongoing cycle of change. Humans also interact with the natural environment. Human beings and the environment are always interrelated and
interdependent. Humans change the natural environment they are dependent on, as they increase in number and deposit waste, and emit harmful gasses into the natural environment every day. The natural balance is being broken, and this is the root cause of environmental problems which have become increasingly apparent in recent years. At the same time, the natural environment is also transforming humans. Human psychology and behavior are dependent, not only on current social stimulus, but also on characteristics of the environment. If human behavior causes the living ecosystem to fall out of balance, it will have a serious effect on people’s psychology and behavior, and may even be life-threatening. However, the natural environment can also have positive influences on human well-being.

Human mental health is basically under the influence of the natural environment. Various phenomena of nature, such as the seasonal climate, weather changes, the amount of sunshine, geography, and geographical conditions as well as color, sound, air, landscape, are important factors, which affect people's psychological health.

Human mental health is dependent, to some extent, on the weather which demonstrates its significant relationship to the natural environment. In the heat of summer, people feel listless and ill at ease, but when a breeze comes these feelings are reduced. Rain often makes people feel depressed or bored and worried, while sunshine makes people feel comfortable and relaxed.

Colors in the natural environment can cause all sorts of different emotional experiences. Colors can be divided into warm and cool colors according to their different psychological effects. Warm colors such as reds, oranges,
yellows, and so on, give feelings of warmth, brilliance, and excitement. Cool colors such as greens, blues, purples and so on, give quiet, elegant feelings. Under normal circumstances, certain colors cause psychological and emotional changes, and thus affect the physiological state. The influence of physiological and psychological mechanisms, in addition to the culture which saturates our experience and influences us are being explored. Colors have electromagnetic energy that works on the pituitary and hypothalamus, affecting the endocrine system, which regulates and controls people’s emotions and other psychological functions.

People need air to breathe, it’s a part of the human condition. Air is more important than food and water. Air humidity, temperature, pressure, flow rate and chemical composition have an impact on people's mental health. Fresh, clean air gives a feeling of relaxed comfort. The heart and lungs moderate the process which regulates nerve excitation and improves cardiovascular and respiratory functions, and accelerates blood circulation and the metabolism. People breathe in oxygen and exhale carbon dioxide, which aids digestive functions and the absorption of favorable elements that promote physical and mental wellbeing. But the corollary is also true, poor air can endanger people’s mental and physical health. If you live in areas of high temperature, low pressure, high humidity, lack of oxygen in the natural environment, you immediately feel bored, depressed, restlessness, irritability and insomnia. When the air is foul, a strange psychological aversion is felt. Long-term air pollution causes symptoms such as nausea, dizziness, fatigue, lack of appetite, and over time will make people irritable, depressed, unhappy, and even mental
illness and sickness will ensue.

The landscape of the natural environment, including the sun, the moon, stars and such terrestrial elements as hills, vegetation, birds and flowers, can influence people’s feelings. When enjoying an amusement park, the beach, villas etc., people feel relaxed, happy and laid-back; when walking, country roads, forest streams, rivers and meadows, inspire poetry and love. A feeling for the beauty of nature is undoubtedly beneficial to physical and mental health.

In many cases, natural ecological environmental destruction has caused physical and psychological disorders and diseases, whereas a healthy environment leads to physical and mental health. There are many different environmental factors about what affect human mental health. Furthermore, in distance-based environmental exposure assessment provides the effects on human mental health. Pretty conducted a study that involved a systematic review of literature on the effects between the natural environment and human mental health. The findings revealed that there are three levels of engagement with nature that contribute to mental health. These levels are: viewing nature (referring to viewing nature through mediums such as windows and even books), incidental exposure to nature (e.g., walking, reading amidst nature), and direct participation with nature (e.g., camping, boating and farming). The natural environment affects all living and non-living things as is its nature, and in this environment, interactions between all living things occur.
1.2 Coastal nature experience and human well-being

In the natural environment, ecosystems can be divided into two types, aquatic and terrestrial. The aquatic environment, includes oceans, lakes, rivers and other waters systems and forms. In moist ocean breezes, the content of negative oxygen ions is higher, and negative oxygen ions acting on the cortex, have sedative and hypnotic effects. Come to the beach, and you can enjoy the sun and bathing in the sea. Standing near the beach, will make your heart feel the depth of the sea and give you a feeling of its unlimited scope, it is refreshing. When floating on the sea, we are charmed as the sea waves rise and fall. Yet the sea and its tides can also be vigorous and mighty, and produce huge amounts of energy. If we synchronize with it, we too can receive its energy. Cool, calm lakes, can be found even in bustling cities. With the accelerating pace of life, people feel under increasing pressure, and if they retreat to the lakes, they can feel relaxed. Chaotic thinking can be calmed by the clarity still water offers. Clarity, mood swings, insomnia, and dreaminess can all be regulated by the quietening effect of lake water, so too can endocrine disorders as well as other diseases.

With the continuous progress of civilization and its concomitant social development, the increasing human impact on the global environment can be seen in human activity in virtually all areas affecting natural systems from the microcosm to the macrocosm. Rapid economic development and large-scale industrial and agricultural modernization and mass production use synthetic chemical products, fossil fuels (such as oil, coal, and natural gas, etc.), and in the course of agricultural modernization, the massive application
of pesticides, herbicides and fertilizers, to satisfy and improve people’s lives are, in the end, causing harm. Modern communication technologies and transportation, make the Earth seemingly smaller, and smaller, yet these bring great changes to our natural environment and now also pose as a threat to human health and even the survival of our species.

In particular, environments associated with water are positively regarded as natural “blue spaces”, and are credited with great positive effects. Over a third of the world’s population naturally chooses to live along a “narrow fringe of coastal land”. Japan, an island country located on the west side of the Pacific Ocean, benefits from the sea that surrounds it. Coastal zone in Japan is a place where the ties between humans and the sea are very close. Stretching along the Sea of Japan, from the northern to southern districts, a large percentage of population depends on coastal and marine resources for their livelihoods, and socio-economic activities like fisheries, shipping and tourism also depend on these resources. The situation changed drastically during the period of high economic growth in the decades following, the coastal environments of Japan have reached a further turning point. One major factor is that many Japanese people point out the importance of the coastal environment positively impacting on human well-being. In view of the above mentioned, the hypothesis of this paper is that coastal environments may be linked to benefits associated with human well-being. One implication of this study is that well-being, which includes mood, mental health, abilities and so on, can be improved by developing a plan associated with water which can help improve our overall health. According to this theme, in this paper,
discern three levels of engagement with natural coastal environments in line with distance-based between the coast and human beings:

(1) The first level is viewing coastal environments from a distance, perhaps from a window or a book.

(2) The second is a temporary experience of a natural coastal environment, through incidental exposure, such as sunbathing, or going to the beach.

(3) The third is direct participation with a natural coastal environment, such as swimming, surfing, or boating.

On the basis of these three levels of engagement with a natural coastal environment, this paper is planned to investigate the effects of the three levels of engagement on human well-being in chapter 2, chapter 3, and chapter 4 respectively.
Chapter 2

Effects of the Coastal Environment on Well-being

2.1 Overview of the coastal environment

Some evidence comes from psychological research that supports the view that nature fosters positive moods and improves mental health. Kawakubo et al. used fingertip plethysmography to confirm that contact with nature can benefit humans’ health, such as by reducing stress. Some studies have demonstrated that time spent gazing at natural environment after a stress-inducing task leads to faster stress recovery than interaction with an urban environment. Additionally, living in a natural environment is associated with fewer stress-related illnesses. Evidence suggests that exposure to nature can have a range of psychological health benefits, including enhanced mood and mental wellbeing.

In line with this theory, previous studies have also pointed out the positive impacts of aquatic settings on individuals’ well-being, compared to those without exposure to such surroundings. In particular, environments with water – positively regarded as natural “blue spaces” – are associated with higher preferences, greater positive effects and higher perceived restorativeness. An aquatic environment is considered to be any environment, natural or urban where water is present in some substantial form. Although aquatic environments might usually be considered to be ones dominated by seas or lakes, Luttik concluded that people paid between 8%
and 12% more for houses with distant views of water in the Netherlands. Lange and Schaeffer\textsuperscript{11)} also supported this with a similar finding that views overlooking lakes were 10% higher than those without views of the lake in Zurich. In the world, over a third of the population naturally chooses to live along a “narrow fringe of coastal land”\textsuperscript{12)}. Tajima et al. \textsuperscript{13)} studied the effects of living near a waterfront area on people’s daily lives and found them to be both positive and high. Generally speaking creating waterfront spaces in general, in cities (such as with apartment complexes and housing, make people feel the “comfort of the waterfront area.” Residents describe the coast as providing space, freedom, relaxation, and the ability to explore. In general, ocean views are believed to influence humans and result in positive psychological effects such as calmness and feelings of peace.

An analysis of panel data from England that explored the positive effects of coastal zones on improving the health and well-being of people\textsuperscript{14)} showed that individuals reported significantly better general health as well as mental health when living closer to the sea\textsuperscript{15)}. Coastal environments have recently received growing attention as people have come to appreciate ocean views. One experiment showed that qualitative and quantitative relaxing effects of living by the sea, were confirmed by visits to the beach\textsuperscript{16)}. Living in a coastal zone is an ideal lifestyle sought by many people.

Japan is an island nation that benefits from the sea that surrounds it on all sides. There are many people who live near the coast. This thesis is planned to investigate whether there are different psychological effects found on residents who live by the sea versus those who do not. To choose this theme
because of its timely ecological/environmental nature and deserve to help people recognize the importance of the interrelationship between the environment and well-being. The hypothesize that having an ocean view, from one’s home, would have an impact on residents’ feelings; that it would increase positive psychological effects, and have lower negative psychological repercussions. This study investigated one coastal zone and one non-coastal area to find out if an effect on individuals’ well-being was apparent. From this research, was able to gain insight into the connections between residents with ocean views and those without, based on gender and age, as well as the effect of different frequencies of ocean views from home.

2.2 Methodology

2.2.1 Subjects

Two residential housing areas were selected, one with ocean views and one without ocean views, to see how coastal zones influence well-being. All residents, whether with or without ocean views, were located in Hyogo Prefecture, Japan.

Questionnaire forms were mailed with a letter explaining the survey’s purpose to randomly selected residents in both coastal and non-coastal areas. A total of 518 people returned the questionnaires, for a collection rate of 12.95 percent. Along with the questionnaire form, for ethical reasons, included a document describing the study’s purpose, as well as a statement that participation was voluntary, and also mentioned privacy-related issues, such as anonymity, would be respected. Completion of the questionnaire in
the prepaid, stamped envelopes signified consent. The survey was conducted during the month of September, 2014.

2.2.2 Psychological effects questionnaire

The self-administered questionnaire included questions about socio-demographics (gender and age), whether respondents had ocean views from their homes, frequency of ocean views, and a psychological effects inventory. In general, the question items were similar to the ones that Suzuki et al.17) used in earlier studies, but this study modified them to facilitate the investigation into the effects of ocean views. The KJ method18) was used to classify 28 question items into five subscales: the passage of time (five items), magnitude and awe (six items), peace of mind (seven items), charm and longing (five items), and threat (five items). Four subscales of the questionnaire had positive effects: the passage of time, magnitude and awe, peace of mind, and charm and longing. Threat was a negative effect.

Participants had to respond to each item on a 5-point Likert-type scale where 1 = “Strongly Disagree,” 2 = “Disagree,” 3 = “Neither Agree nor Disagree,” 4 = “Agree,” and 5 = “Strongly Agree.” Each subscale was scored by calculating the mean of the item responses.

2.2.3 Statistical analysis

The questionnaire data were excluded from analysis if residents failed to provide all the necessary information.

In the statistical analysis, calculated the mean values of the inventory
scores between residents with and without ocean views. Then compared the
inventory scores between residents (with or without ocean views) based on
gender. Subsequently, all residents were categorized into three groups
according to age: younger (from teens to thirties), middle-aged (from forties
to fifties), and the elderly (from sixties to seventies). So the data could be
compared inventory scores based on age. Finally, in order to evaluate if
different frequencies of ocean views had a psychological effect on residents.
The subjects were categorized into three groups according to frequency of
ocean viewings from homes. High frequency (see the sea every day), medium
frequency (see the sea once a week or twice a week), and low frequency (see
the sea once a month or not at all).

The inventory data were analyzed using the Statistical Package for Social
Sciences (SPSS, 2007) software. In order to summarize and interpret the
descriptive data, conducted a one-way analysis of variance (ANOVA) and
Tukey’s HSD post-hoc analysis for multiple comparisons. The statistical
significance level is set at \( p < .05, p < .01 \).

2.3 Results

2.3.1 With/without ocean views

518 participants completed questionnaires were received; 301 (58%) had
ocean views, while 217 (42%) did not.

Regarding the contrast between coastal and non-coastal views, the data in
Table 2.1 show a significant difference \( p < .05 \) for magnitude and awe, and
strong significant differences \( p < .01 \) for peace of mind, charm and longing,
and threat. In terms of the passage of time \( (p = .20) \), there is no significant difference between the two areas.

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Coast and Non-coast</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Passage of time</td>
<td>1.60</td>
</tr>
<tr>
<td>Magnitude and awe</td>
<td>6.00</td>
</tr>
<tr>
<td>Peace of mind</td>
<td>19.50</td>
</tr>
<tr>
<td>Charm and longing</td>
<td>48.22</td>
</tr>
<tr>
<td>Threat</td>
<td>8.79</td>
</tr>
</tbody>
</table>

Note: F corresponding F-test statistics

2.3.2 Gender with/without ocean views

The overall proportion of participants with ocean views consisted of 164 females (54%) and 137 males (46%); 128 females (59%) and 89 males (41%) did not have ocean views.

In terms of the contrast between coastal and non-coastal environments based on gender, the data in Table 2.2 show a significant difference \( (p < .05) \) for passage of time, and strong significant differences \( (p < .01) \) for magnitude.
and awe, peace of mind, and charm and longing on males. In terms of males, the threat \((p = .62)\) is not significant between coastal and non-coastal environments. The impact on females shows a significant effect \((p < .05)\) on peace of mind, and has a highly significant effect \((p < .01)\) on the magnitude and awe, charm and longing, and threat. The passage of time \((p = .87)\) is not significant.

Table 2.2  Associations between gender and with/without ocean views
\((^* p < .05, ^{**} p < .01)\)

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(F)</td>
<td>(p)</td>
</tr>
<tr>
<td>Passage of time</td>
<td>5.08</td>
<td>*</td>
</tr>
<tr>
<td>Magnitude and awe</td>
<td>7.84</td>
<td>**</td>
</tr>
<tr>
<td>Peace of mind</td>
<td>20.88</td>
<td>**</td>
</tr>
<tr>
<td>Charm and longing</td>
<td>31.46</td>
<td>**</td>
</tr>
<tr>
<td>Threat</td>
<td>0.25</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Note: \(F\) corresponding F-test statistics
2.3.3 Age with/without ocean views

In terms of the age distribution of participants with ocean views, 79 (26%) were in their 10s–30s, 110 (37%) were in their 40s–50s, and 112 (37%) were in their 60s–70s; regarding those without ocean views, 111 (51%) were in their 10s–30s, 77 (35%) were in their 40s–50s, and 29 (14%) were in their 60s–70s.

Regarding the differences between those with and without ocean views, and based on residents’ ages, the results from Table 2.3 show a significant effect ($p < .05$) on passage of time for the younger group. The magnitude and awe ($p = .57$), peace of mind ($p = .50$), charm and longing ($p = .20$), and threat ($p = .14$) are not significant. In terms of the middle-aged group the results show a significant increase ($p < .05$) on passage of time, and strong significant increases ($p < .01$) for magnitude and awe, peace of mind, as well as charm and longing. There is no significant increase based on the threat ($p = .53$). In terms of the elderly group the results show significant increases ($p < .05$) on peace of mind and threat, and a strong significant increase ($p < .01$) on charm and longing. There is no significant difference on the passage of time ($p = .82$), or magnitude and awe ($p = .22$).

Finally, in order to explore the relationship between the three age groups and the effects of a coastal environment on well-being. A multiple comparison analysis was carried out, shown in Table 2.4. The correlation between the younger and middle-aged group is positive and significant ($p < .01$) for the passage of time, magnitude and awe, peace of mind, and charm and longing. The link between the younger and elderly group is also strongly significant
(\(p < .01\)) for the four positive effects. However, the threat subscale shows no significant change in either the younger and middle-aged groups, or the younger and elderly groups. When comparing the middle-aged and elderly groups, there is no significant change on any of the five subscales.

Table 2.3  Associations between three age groups and with/without ocean views
(* \(p < .05\), ** \(p < .01\))

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Younger</th>
<th>Middle</th>
<th>Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(F)</td>
<td>(p)</td>
<td>(F)</td>
</tr>
<tr>
<td>Passage of time</td>
<td>4.78</td>
<td>*</td>
<td>4.56</td>
</tr>
<tr>
<td>Magnitude and awe</td>
<td>0.33</td>
<td>0.57</td>
<td>7.89</td>
</tr>
<tr>
<td>Peace of mind</td>
<td>0.45</td>
<td>0.50</td>
<td>8.97</td>
</tr>
<tr>
<td>Charm and longing</td>
<td>1.63</td>
<td>0.20</td>
<td>25.01</td>
</tr>
<tr>
<td>Threat</td>
<td>2.27</td>
<td>0.14</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Note: \(F\) corresponding F-test statistics
2.3.4 Frequency of ocean views

The overall proportion of 301 participants with ocean views, 236 (78%) were in the high frequency group (see the sea every day), 39 (13%) were in the medium frequency group (see the sea once a week or twice a week), 26 (9%) were in the low frequency group (see the sea once a month or not at all). Regarding gender, the high frequency group consisted of 107 females and 129 males; the medium frequency group consisted of 18 females and 21 males; the low frequency group consisted of 11 females and 15 males.

Regarding the differences between high frequency and low frequency groups, the data in Figure 2.1 show a positive significant effect (*p < .01) on

Table 2.4 Tukey’s HSD post-hoc analysis for three age groups living on the coast
(*p < .05, **p < .01)

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Younger / Middle</th>
<th>Younger / Elderly</th>
<th>Middle / Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M1 SE1 p</td>
<td>M2 SE2 p</td>
<td>M3 SE3 p</td>
</tr>
<tr>
<td>Passage of time</td>
<td>-0.54 0.11 **</td>
<td>-0.58 0.11 **</td>
<td>-0.05 0.10 0.90</td>
</tr>
<tr>
<td>Magnitude and awe</td>
<td>-0.38 0.10 **</td>
<td>-0.33 0.10 **</td>
<td>0.05 0.09 0.86</td>
</tr>
<tr>
<td>Peace of mind</td>
<td>-0.32 0.10 **</td>
<td>-0.37 0.10 **</td>
<td>-0.06 0.09 0.80</td>
</tr>
<tr>
<td>Charm and longing</td>
<td>-0.42 0.12 **</td>
<td>-0.52 0.12 **</td>
<td>-0.11 0.11 0.60</td>
</tr>
<tr>
<td>Threat</td>
<td>0.12 0.16 0.71</td>
<td>0.19 0.16 0.45</td>
<td>0.06 0.14 0.89</td>
</tr>
</tbody>
</table>

Note: SE corresponding standard error of mean
M1 = M (younger) – M (middle), M2 = M (younger) – M (elderly), M3 = M (middle) – M (elder
passage of time, magnitude and awe, peace of mind, and charm and longing. Between high frequency and medium frequency groups, there were also strong positive significant effects ($p < .01$) on the passage of time, peace of mind, and charm and longing; positive significant effect ($p < .05$) on the magnitude and awe. There were no significant differences between medium frequency and low frequency groups on the passage of time, magnitude and awe, peace of mind, and charm and longing. Furthermore, there was no significant difference on the threat subscale in the high frequency, medium frequency and low frequency groups. People with high frequency ocean views showed a significant positive effect over those of medium and low frequency viewings.

![Figure 2.1](image)

Figure 2.1 Mean scores for three different frequencies of ocean views
However, there were no negative significant differences between the three types of frequency viewers.

In terms of males (Figure 2.2) between high frequency and medium frequency groups, high frequency and low frequency groups, there were significant changes ($p < .05$) on passage of time, magnitude and awe, and peace of mind, strong significant changes ($p < .01$) on charm and longing. However, there were no significant changes between medium frequency and low frequency groups on these four subscales. There were also no significant changes on the threat subscale between the three frequencies. In terms of females (Figure 2.3) between high frequency and medium frequency groups, high frequency and low frequency groups, there were strong positive significant changes ($p < .01$) on passage of time, peace of mind, and charm and longing. In terms of magnitude and awe, there was a strong positive significant change ($p < .01$) between high frequency and low frequency groups, and medium frequency and low frequency groups, but there was no significant change between high frequency and medium frequency groups. In terms of the threat subscale, there were significant changes between high frequency and low frequency groups, and medium frequency and low frequency groups. The association of different frequencies and females with psychological effects showed high positive and negative significant differences. However, the association of different frequencies of views and males with psychological effects showed a high positive significant difference, but no negative significant difference.
Figure 2.2 Mean scores between males and three different frequencies of ocean views

Figure 2.3 Mean scores between females and three different frequencies of ocean views
2.4 Discussion

After adjusting for frequencies of ocean views, gender, age, and with/without ocean views, there is an apparent increase in individual wellbeing when living in proximity to the ocean. The difference in the percentage of people reporting positive psychological effects in both coastal and non-coastal zones appears to strengthen with gender and age, but the difference is much stronger in coastal areas. The benefits of living near the coast may mitigate some negative psychological effects.

2.4.1 Coastal environment and psychological effects

In this research, found that coastal environments had a much more positive influence on residents’ psychological effect than non-coastal environments, furthermore, in the coastal environment, the higher frequency of ocean views, the better the positive effects proved to be. The coast seems to have an impact on reducing stress, and coastal zones may be considered therapeutic landscapes. This is important since visits to the coast are associated with especially strong feelings of restoration, and over time these feelings can help attenuate stress\(^\text{19}\). Compared with visits to non-coastal areas, the data indicate that visits to the coast are linked with higher levels of reduced stress and positive emotions (e.g., calmness, relaxation). Watanabe et al. \(^\text{20}\) supplied some supportive evidence on the restorative effects of exposure to the natural environment, which made viewers feel more relaxed. Engaging with nature heals the mind and body and promotes recovery from stress.

Residents with ocean views emphasized the positive impacts they
experienced from gazing at the sea, while those without ocean views did not express such feelings. The benefits of ocean views resonated with charm and longing, magnitude and awe, and peace of mind. People who live near the water believe ocean views are a good feature. Engaging with coastal environments may lead to better well-being due to the value of charm and longing that comes with greater leisure time spent near the sea. The closer people live to the ocean, the more likely they are to visit it. People with high frequency ocean views showed a significant positive effect difference when compared to lower frequency viewers. Access to the coast also seems to play a part in magnitude and awe as well. For example, walking on the beach is considered beneficial for positive emotions and feeling the power of nature. Choi et al. \textsuperscript{21)} indicated that alpha wave stimuli resulted from one’s psychological state based on contact with nature. If people live near the sea, they have many opportunities to hear the sound of waves, which is calming and brings peace of mind. However, regarding the passage of time, there was no significant evidence that living near the ocean had any benefits compared to living away from it. In this study, did not find any evidence of a beneficial effect of coastal proximity for the passage of time subscale.

These results suggest that this research be used to explain the benefits of coastal living, which can be applied to other fields as well. Exposure to coastal zones may reduce stress, promote physical activity, and encourage positive social interactions, all of which have been linked with favorable health outcomes\textsuperscript{22), 23)}. In terms of physical activity, studies have shown that people who live in a coastal environment are more likely to report higher
levels of physical activity than those who live inland\textsuperscript{24, 25}. Evidence from social interactions has emerged that visits to the beach may especially promote family relationships and a more positive relationship with nature\textsuperscript{26}. The findings indicate that the positive psychological effects of living near the coast and spending time there has a positive impact on physical health and social interactions; this warrants further investigation.

In sum, coastal environments encourage a number of positive psychological benefits and behaviors that promote well-being; those who live near the coast are more likely to take advantage of these opportunities for increased wellbeing. The advantages of living near the sea are more strongly associated with increases in positive outcomes and reductions in negative ones.
Figure 2.4 Mean scores for with/without ocean views
(* p < .05, ** p < .01)
2.4.2 Associating coastal environment and gender with psychological effects

The male-to-female ratio of the coastal and non-coastal environments in this survey was significant. Living near the coast was more strongly related to psychological effects for both men and women. In addition, the data reveal that women living near the sea have higher average scores than men on the four subscales (the passage of time, magnitude and awe, peace of mind, and charm and longing). On the other hand, they score lower than men on threat. Furthermore, the association of different frequencies and males with psychological effects showed a high positive significant difference, but there was no negative significant difference. The association of different frequencies and females with psychological effects showed high positive and somewhat negative significant difference.

Having an ocean view compared to those without an ocean view was significantly linked with positive impacts among males. Japanese men tend to have poor mental health and a higher level of work related stress. It has been reported that men’s poor mental health results from high occupational tension, and that lifestyle affects their mental health. Hence, men are a potential target population in the community for mental health support. This study suggested that ocean views may be an instance of an important natural environment, which is of benefit for males to improve their mental health.

There were significant differences in positive effects among females between those with ocean views and those without. Above all, women living in coastal zones had a high numerical value when questioned about gazing at the sea, they described a feeling of peace. The numerical value of women who
live with ocean views had a fairly high value for charm and longing. Regarding the passage of time, there was no difference in score for women with or without ocean views, but women with them showed a higher range of error.

As previously mentioned, women with ocean views showed more positive psychological effects than men. This may be due to traditional gender roles in Japan. There are many full-time housewives, and thus women have many more opportunities to look at the sea; staying at home and away from the office seems to have a positive correlation with health. Moreover, there is a significant difference in score, only among women, for negative effects of threat. The impact of threat on women living with ocean views is lower than for men. It presume that the sea’s freshness and openness influenced women more so than men, and that women were thus more able to resist the impact of negative feelings.
Figure 2.5 Mean scores for male and with/without ocean views
(* p < .05, ** p < .01)

Figure 2.6 Mean scores for female and with/without ocean views
(* p < .05, ** p < .01)
2.4.3 Associating coastal environment and age with psychological effects

Coastal effects are based on gender, but they were also found based on age. The effect of age on coastal and non-coastal living, despite the fact that the participants selected from Hyogo Prefecture were from an unbalanced sample size for the three age groups.

The data were analyzed for the three age groups independently. There was a tendency for average values to rise as the age groups get older. The psychological impacts on the elderly group had higher average scores than the other groups. This difference may be explained by the residents’ different backgrounds (e.g., age and sex) or by variations in the frequency and intensity of health-related issues. The link between those with ocean views versus those without in relation to individuals’ psychological effects seems to be connected to age and gender. Individual well-being could be promoted by including more opportunities to view the ocean. The impact of coastal environments on relieving stress and improving charm and longing are considered beneficial for well-being, more so than in non-coastal zones.

With respect to the psychological effects, a significant difference was observed between those with and without ocean views. The numerical, positive values of the younger group with ocean views were only somewhat higher than those without. This may be due to competition with ocean views from schools and other social activities, so see less of an effect on younger people, whether or not they have an ocean view. However, the middle-aged group living on the coast had a much higher numerical value than middle-
aged participants living inland. The middle-aged group has a strong sense of the effects resulting from ocean views on their busy day-to-day lives. Likewise, elderly people were much more likely to feel stronger psychological effects than those without. The elderly have more leisure time to enjoy the sea.

Despite living relatively close to the coast and perceiving health benefits, younger residents did not regularly enjoy ocean views or visit the beach. They often express little desire to appreciate the sea or go to the beach to play or relax. It was assumed that all people would have a positive opinion of the sea. For example, on the beach, there is no need to look at or worry about the time. Now, however, young people always have their mobile phones with them, and this takes up a lot of their time. Nowadays, even though young people spend less time in nature, merely living near the sea offers long-term exposure to ocean views, which should provide greater benefits than for individuals without them. Ocean views benefit older people more than younger people, perhaps by arousing fond memories of the passage of time, as well as the other reasons previously mentioned.

The middle-aged respondents with ocean views also felt the sea’s openness and vastness more positively than the younger group, despite their busy schedules. This research shows that, in terms of magnitude and awe, peace of mind, and charm and longing, they strongly appreciate and enjoy the seaside. Among the positive effects are shown in the distinct scores among the age groups, the different average values of middle-aged people between coastal environments and non-coastal environments increased in numerical worth.
more than those of the young or elderly.

Across all subscales, the factor of age demonstrated some significant positive differences. Compared to the other two groups, elderly people with ocean views were more likely to feel the passage of time, magnitude and awe, peace of mind, and charm and longing. Especially, observed differences in the passage of time, as shown in the higher average value of the scores. It is said that as we get older, we have more opportunities to look back on the past. According to Yamazaki et al. 27), the frequency of reminiscence was shown to be higher among the elderly and middle-aged. One might speculate that this is one reason why the elderly group scored high for the passage of time, they enjoy opportunities to remember the past. The elderly have more of a tendency to reminisce, and time increases the frequency of recollection. In other words, the elderly have a positive, subjective sense of well-being associated with ocean views, based on the relaxed state that allows them to remember the past fondly. They have more time to stay at home, and thus find it easier to feel the charm and longing of the ocean than younger and middle-aged people. Young people have less interest in being in nature; this might be why they scored lower than the elderly on magnitude and awe, charm and longing, and peace of mind aroused from the idea of ocean views.

Ocean views are believed to give us feelings of comfort and peace of mind, as well as a sense of well-being. However, it has also been shown that the tsunami that followed the Great East Japan Earthquake negatively affected well-being. The relationship between coastal zones as a healthy, natural environment that promotes well-being remains true, despite the danger that
sometimes comes with it. The well-established and important literature on the positive effects still hold true. Even though focused on age and gender, in this study believe that even tsunami survivors will once again come to appreciate the calming effects of the sea.

![Graph showing mean scores for younger and with/without ocean views](image)

*Figure 2.7 Mean scores for younger and with/without ocean views

(* p < .05, ** p < .01)
Middle-aged

Y: with ocean views  N: without ocean views

Figure 2.8 Mean scores for middle-aged and with/without ocean views
(* p < .05, ** p < .01)
Elderly

Y: with ocean views  N: without ocean views

Figure 2.9 Mean scores for elderly and with/without ocean views
(* $p < .05$, ** $p < .01$)
2.5 Conclusion

A questionnaire survey was conducted to clarify the impact that coastal environments have on individuals’ wellbeing; 518 residents living in Hyogo Prefecture’s coastal and non-coastal zones participated. After adjusting for gender, age, and frequencies of ocean views, an apparent beneficial effect from living in proximity to the coast was found. The following results were obtained.

First, compared to those who live inland, people who live near the sea showed higher positive psychological effects for the passage of time, magnitude and awe, peace of mind, and charm and longing. Moreover, it was also found that the negative psychological effect of threat was lower for coastal residents. Thus, living by the ocean leads residents to feel positive emotions (such as calmness and peace) and promotes general well-being.

Second, coastal environments had a greater positive influence on men than non-coastal environments. Furthermore, women living near the ocean had an increased likelihood of feeling more positive emotions in homes with ocean views, than those without as well. Despite the fact that coastal environments have been shown to exert influence on both males and females, these findings reveal that the seaside has stronger positive effects on females than on males. In addition, the negative effects of ocean views on females were weaker than on males.

Third, the younger, middle-aged, and elderly groups living in the coastal zone experienced more positive improvements than those in non-coastal zones. All three groups tended to demonstrate significant differences regarding the
presence of an ocean view. The younger group was more likely to feel less positive effects than the middle-aged or elderly groups. The elderly group showed less negative effects than the younger or middle-aged groups. The positive consequences were strongest for the elderly due to more exposure to ocean views.

Fourth, different frequencies of ocean views have a more beneficial psychological effect on individuals as the frequency of viewings increase. High frequencies of ocean views were more beneficial, in terms of psychological effects, for both men and women, than those with medium and low frequencies. Females who see the sea more frequently, showed less negative psychological effects than males.

In summary, the potential benefits of living in proximity to coastal environments are that they have a positive effect on people. Many results conducted throughout this study have confirmed that coastal zones may enhance positive emotions. However, several shortcomings limit this generalization. It is not assumed that all potentially relevant variables; therefore further study, in conjunction with more detailed potential benefits of living in coastal zones, as well as the effects of overdevelopment, are needed. Future study would also like to clarify and expand this study with a larger sample size.

It should consider the value of leisurely visits to the seaside to promote public health and psychological well-being as well. Even if it is not feasible for everyone to live in or near a coastal zone, some characteristics of coastal environments could be developed to elicit the relevant aspects which benefit
good health. Further understanding of the effects of living near the ocean could be instructive for health interventions that encourage more people to spend time by the sea.
References


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Chapter 3

Effects of the Beach on Mood and Mental Health

3.1 Overview of recent beachfront trends

The World Health Organization has reported that “a quarter of individuals suffer from mental or behavioral disorders both in developed and developing countries”. By 2020, mental disorders will become the largest problem relating to ill health\(^1\). In Japan, Kawakami et al.\(^2\) confirmed that both men and women were at great risk of developing mental health problems. Therefore, addressing mental health problems is a socially relevant issue.

Previous studies that have investigated within-subject aspects have frequently shown that an environment with nature affects mood and mental health\(^3, 4, 5\). Furthermore, the prevalence of physical activity among the general populations, is a predictor of the mental health of the population. In other words, whether the overall levels of physical activity are consistently higher than the overall levels of non-activity plays an important role in mood and mental health, especially depression and anxiety\(^6, 7, 8, 9\).

The beach is a type of environment that is replete with nature’s beauty; people enjoy relaxing beach scenes in terms of looking at the blue sea, running on the soft sand, and soaking up the sunshine. In addition to enjoying and admiring beach scenes, people also enjoy engaging in beach activities like boating, fishing, surfing, scuba diving, and other watersports. Ashbuly et al.\(^10\) reported that in Southwest England, approximately 15 families, which
included 24 parents, reported a major improvement in health and wellbeing that was related to being in a beach environment. The beachfront is recognized as a nature environment that often exerts a positive effect on individuals from the viewpoint of improving their level of psychological health\(^{11}\).

On the basis of these findings, this paper investigates the effects of exposure to a beachfront to understand if it influences the mood and mental health of people. Japan is an island country with many beaches. However, until now, the effects of manipulating geographical advantages to improve psychological health were unclear. It is assumed that beaches improve mood and mental health to a great extent, therefore, maximizing the potential development of beach environments is important.

The present study investigated the hypothesis that a beach environment positively influences mood and mental health. Therefore, using data obtained from two questionnaires, a short version of Sakano et al.‘s Mood Inventory\(^{12}\) and the General Health Questionnaire (GHQ-12)\(^{13}\), aimed to examine two aspects of exposure to beachfront that would help us understand factors that influencing mood and mental health if any. Study 1: frequencies of beach-going and its effects on mental health, to (1) examine three different frequencies (high, medium, and low) of going to the beach to see if they have an influence on mental health, and to (2) evaluate the relationship of the three frequencies of going to the beach with gender and mental health, and finally (3) to evaluate the relationship of the three frequencies of going to the beach with age and mental health. Study 2: examine degrees of enthusiasm for
beach-going and its effect on mood and mental health, to (1) examine whether three levels of enthusiasm (high, moderate, and low) for going to the beach have differing effects on mood and mental health status (basic attributes), and to (2) evaluate the three degrees of enthusiasm for going to the beach on the basis of gender, and investigate the association of these gender-based differences with mood and mental health.

3.2 Study 1: Frequency of beach-going

3.2.1 Subjects

Participants were recruited in the Kinki Region of Japan to participate in this survey. Details of the studies were shown on a questionnaire and participants agreed to a time for testing. A total of 181 people, 105 males, 76 females ranging in age from teens to forties, completed the questionnaire.

3.2.2 GHQ-12 questionnaire

In study 1, the data were obtained from an anonymous, and self-administered questionnaire, that included socio-demographics (gender, age), the frequency of going to the beach, and the 12-item General Health Questionnaire. All the participants were categorized into three groups by their frequency of going to the beach: high frequency (more than three times a year); medium frequency (twice a year); low frequency (once a year or not at all).

The 12-item General Health Questionnaire (GHQ-12) was used to measure the effects of the different frequencies of going to the beach on human mental
health. The GHQ-12 is a self-administered questionnaire identifying non-psychotic and minor psychiatric disorders. The GHQ-12 consists of twelve items, which are rated on a 4 point Likert-type scale from 1 (Strongly Disagree) to 4 (Strongly Agree). Each subscale was scored by taking the mean of the item responses. Lower scores were considered to indicate positive mental health status.

### 3.2.3 Statistical analysis

Missing or incomplete data were excluded from the questionnaire analysis. In the statistical analysis, compared the inventory scores of the high frequency, medium frequency, and low frequency groups and also examined gender-based/age-based with regard to the effect of different frequencies of beach-going on the inventory scores.

The data were entered and analyzed using the Statistical Package for Social Sciences (SPSS, 2007) software. Conducted a one-way analysis of variance (ANOVA) and Tukey’s HSD post-hoc analysis for multiple comparisons in order to summarize and interpret the descriptive data. Initially, descriptive analyses (Mean [M], Standard Error [SE], p-value [p]) were conducted to explore differences among the GHQ-12 subscale scores and to compare the scores of the high frequency, medium frequency, and low frequency groups. Furthermore, the gender-based, and age-based mean scores were also calculated on the questionnaires and the prevalence of the frequency of going to the beach. The statistical significance is set at $p < .05$, $p < .01$. 

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3.2.4 Results and discussion

Figure 3.1 presents the proportions of frequency of going to the beach in this survey. 48 participants (26%) who go to the beach once a year or not at all, were classified as the low frequency respondents. 69 participants (38%) who go to the beach twice a year were classified as the medium frequency group. 30 participants (17%) who go to the beach three times a year, 20 participants (11%) who go to the beach four times a year, and 14 participants (8%) who go to the beach more than five times a year were classified as the high frequency group.

Figure 3.1 The proportion of the frequency of going to the beach
3.2.4.1 Three different frequencies of going to the beach

The data in Figure 3.2 show a significant difference \((p < .05)\) on the GHQ-12 between medium frequency \((M = 2.01)\) and high frequency \((M = 1.71)\), and also between low frequency \((M = 1.96)\) and high frequency \((M = 1.71)\). However, there was no significant difference between low frequency \((M = 1.96)\) and medium frequency \((M = 2.01)\).

In order to examine the impact of three different frequencies of going to the beach on human mental health, in the GHQ-12 questionnaire, respondents had a marked improvement on mental health that correlated with frequency of beach going. It was anticipated that going to the beach would heal the mind and body of fatigue, and promote recovery from stress. Experiencing beach environments with open air, beautiful scenery, and being able to view the sea is considered to be a restorative treatment for mental health. Physical activities have been shown to improve overall mental health. When going to the beach, people also enjoy swimming, surfing, and other physical activities. The findings suggest that beach activities are likely to be strongly related to good mental health.

In Japan, many people experience great stress from work, society, and family issues. Going to the beach could be an important method for improving overall mental health.
Figure 3.2 Mean GHQ-12 scores for three frequencies of going to the beach

Figure 3.3 Mean GHQ-12 scores for three frequencies of going to the beach and gender
3.2.4.2 Gender and frequency of going to the beach

In terms of the contrast among the three frequencies of going to the beach based on gender, the data in Figure 3.3 shows significant differences ($p < .01$) on the GHQ-12 between medium frequency ($M = 1.91$) and high frequency ($M = 1.66$), and low frequency ($M = 1.97$) and high frequency ($M = 1.66$) on males. However, there was no significant difference on GHQ-12 between low frequency ($M = 1.97$) and medium frequency ($M = 1.91$). For females, the only significant differences were between medium frequency ($M = 2.05$) and high frequency ($M = 1.80; p < .05$). There were no significant differences between low and medium frequencies, and low and high frequencies. In particular, the mean GHQ-12 scores for males were lower than for females.

The gender-based prevalence of GHQ-12 was compared among the three frequencies of going to the beach. The more frequently people go to the beach, the better their mental health, in both men and women. Moreover, all three frequencies of going to the beach had a stronger positive influence on men’s mental health than for women’s. This may be because Japanese women often avoid the sun’s ultraviolet rays on the beach, and therefore enjoy the beach environment less than men. Furthermore, in Japan, beach activities, such as swimming and surfing, to release stress, may be more popular with men than for women. In Japan, many full-time housewives don’t have enough time to go to the beach, due to their demanding schedules. This may be another reason why the beach environment’s effect on mental health was more pronounced for men.

In sum, the findings reveal that the beach environment improved mental
health for both males and females, and there was a significant improvement for males’ mental health. In this study, encourage more women to go to the beach, to enjoy the sea, and do more beach activities.

3.2.4.3 Age and frequency of going to the beach

The results from Figure 3.4 show the mental health of three different frequencies of going to the beach associated with respondents in their teens, twenties, thirties and forties. The data show a significant difference ($p < .05$) on the GHQ-12 between medium and high frequencies, and low and high frequencies for the group in their thirties, and show strong significant differences ($p < .01$) between medium and high frequencies, and low and high frequencies for teens, and groups in their twenties and forties. There were no significant differences on the GHQ-12 between low frequency and medium frequency for teens, and respondents in their twenties, thirties and forties.

The data were examined for teens, twenties, thirties and forties groups, which revealed a tendency for mean GHQ-12 scores to decrease (indicating good mental health) as the frequency increased. In particular, those in their teens and twenties showed the strongest significant difference. Obviously, the younger-aged people spend much more time at the beach with families, friends and so on, so the younger-aged people showed better mental health affected by beach environment than those in their thirties and forties.

In this study, could see the effect of beach-going on different age groups’ mental health, despite that the imbalance of the different aged participants. Therefore, further studies with larger sample sizes surveying the relation between beach environment and human mental health based on age are needed.
Figure 3.4 Mean GHQ-12 scores for three frequencies of going to the beach and age
3.3 Study 2: Degrees of enthusiasm for beach-going

3.3.1 Subjects

The survey (between July and August 2014) was administered to 180 people (104 males [57.8%] and 76 females [42.2%]), who were randomly selected from among people on Azur Maiko beach in Kobe, Japan. The aim of the study was explained to the participants. Further, the survey was anonymous, participation was voluntary, and the participants were given the right to withdraw their participation at any time. If the participants returned the completed questionnaire, it was considered as consent for their responses to be used in the study.

3.3.2 Mood inventory and GHQ-12 questionnaire

In the present study, the data were obtained from an anonymous, self-administered questionnaire survey on the effect of beaches on mood and mental health. The self-administered questionnaire included questions concerning socio-demographics (gender) and the degree of enthusiasm for going to the beach; the participants also had to complete a short version of Sakano et al.’s Mood Inventory and the GHQ-12 questionnaire.

The participants had to rate their degree of enthusiasm for going to the beach on a 5-point Likert scale (very enthusiastic, somewhat enthusiastic, neutral, not very enthusiastic, and not at all enthusiastic). On the basis of their responses, they were categorized into three groups: high enthusiasm group (very enthusiastic), moderate enthusiasm group (somewhat enthusiastic), and low enthusiasm group (neutral, not very enthusiastic, or not
at all enthusiastic).

The original Mood Inventory by Sakano et al.\textsuperscript{12}) is a self-administered questionnaire designed to measure an individual’s state of mood. The questionnaire has high reliability and validity. A short version of the original Mood Inventory developed by Sakano et al. was used. The short version had five subscales: tension and excitement, fatigue, depressive mood, anxious mood, and refreshed mood, and each subscale comprised three items. The participants had to indicate their responses by rating each item on a 4-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree). The score on each subscale was calculated by taking the mean of the item responses.

The General Health Questionnaire (GHQ) by Goldberg\textsuperscript{13}) is also a self-administered screening questionnaire designed for use in mental health consulting settings and aims to detect those with a diagnosable psychiatric disorder. For the measurement of mental health, the GHQ-12 was used. The simplest version of the GHQ-12, which is a short version of the original GHQ-60, is a reliable and convenient self-rating questionnaire used to screen for minor psychiatric disorders. In this study, the GHQ-12 comprised twelve items. The participants were required to respond to each item on a 4-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree). The score of each subscale was calculated by taking the mean of the item responses.

To encourage all the participants to answer truthfully, emphasized that their responses were anonymous, would be kept confidential, and would be
analyzed collectively rather than individually. The participants were also told that there was no right or wrong answer to any of the test items and that honest responses were of great importance. The privacy protection policy for personal and enrollment data was clearly stated in the questionnaire.

3.3.3 Results

3.2.3.1 Degree of enthusiasm for going to the beach

Sixty-six participants (36.7%) were in the high enthusiasm group, 66 participants (36.7%) were in the moderate enthusiasm group, and 48 participants (26.6%) were in the low enthusiasm group. The data in Table 3.1 show that there was a significant difference in increase in scores ($p < .05$) between the high and moderate enthusiasm groups only on the depressive mood subscale. With regard to scores on the tension and excitement, fatigue, anxious, and refreshed mood subscales and on the GHQ-12, there were no significant differences with regard to variations in the participants’ scores between the high and moderate enthusiasm groups. However, the mean scores on the fatigue ($M_1 = -0.152$) and anxious mood ($M_1 = -0.106$) subscales, and the GHQ-12 ($M_1 = -0.141$) showed an ascending trend, and the refreshed mood scores ($M_1 = 0.162$) showed a descending trend between the high and moderate enthusiasm groups; in other words, fatigue, anxiety, refreshed mood and mental health improved for those who had a high degree of enthusiasm for going to the beach and worsened in the case of those who had a low degree of enthusiasm for going to the beach. This suggests that a high degree of enthusiasm for going to the beach had a greater influence on participants’
moods and mental health than did a moderate degree of enthusiasm for going to the beach.

Moreover, by analyzing the scores of the high enthusiasm and low enthusiasm groups, found that depressive mood and refreshed mood and GHQ-12 scores had strong significant effects \( p < .01 \), and anxious mood had a significant effect \( p < .05 \). No significant effects were found with regard to tension and excitement \( p = 0.993 \), and fatigue \( p = 0.534 \). These findings suggest that the effects of a high degree of enthusiasm for going to the beach on the participants’ mood and mental health were more pronounced than the effects of a low degree of enthusiasm for going to the beach. Furthermore, the effects of going to the beach on the depressive mood, anxious mood, and refreshed mood subscale scores and the GHQ-12 scores were the most pronounced all cases, high, moderate, low enthusiasm groups.

On the mood inventory and GHQ-12, there was no significant difference in scores between the moderate and low enthusiasm groups. However, anxious mood \( \bar{M}_3 = -0.185 \) and refreshed mood \( \bar{M}_3 = 0.255 \) had small numerical values; for tension and excitement \( \bar{M}_3 = -0.050 \), depressive mood \( \bar{M}_3 = -0.069 \), and the GHQ-12 \( \bar{M}_3 = 0.094 \), somewhat moderate numerical values were obtained in the case of the moderate and low enthusiasm groups.

It is important to note that there was a tendency for the average mood and mental health scores to improve as the degree of enthusiasm for going to the beach increased. Specifically, from among all the subscales, vast differences in scores were obtained on the depressive mood, anxious mood, refreshed mood and GHQ-12.
Table 3.1  Three varying degrees of enthusiasm for beach-going
Means, SE, and $p$ -values from the ANOVA and Tukey HSD post-hoc analysis
(* $p < .05$, ** $p < .01$)

<table>
<thead>
<tr>
<th>Subscales</th>
<th>high-moderate</th>
<th></th>
<th>high-low</th>
<th></th>
<th>moderate-low</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M_1$</td>
<td>SE$_1$</td>
<td>$p$</td>
<td>$M_2$</td>
<td>SE$_2$</td>
<td>$p$</td>
</tr>
<tr>
<td>Tension and excitement</td>
<td>0.06</td>
<td>0.09</td>
<td>0.79</td>
<td>0.01</td>
<td>0.10</td>
<td>0.99</td>
</tr>
<tr>
<td>Fatigue</td>
<td>-0.15</td>
<td>0.09</td>
<td>0.25</td>
<td>-0.11</td>
<td>0.10</td>
<td>0.53</td>
</tr>
<tr>
<td>Depressive mood</td>
<td>-0.24</td>
<td>0.09</td>
<td>*</td>
<td>-0.31</td>
<td>0.10</td>
<td>**</td>
</tr>
<tr>
<td>Anxious mood</td>
<td>-0.11</td>
<td>0.11</td>
<td>0.61</td>
<td>-0.29</td>
<td>0.12</td>
<td>*</td>
</tr>
<tr>
<td>Refreshed mood</td>
<td>0.16</td>
<td>0.12</td>
<td>0.40</td>
<td>0.42</td>
<td>0.14</td>
<td>**</td>
</tr>
<tr>
<td>GHQ-12</td>
<td>-0.14</td>
<td>0.06</td>
<td>0.05</td>
<td>0.24</td>
<td>0.07</td>
<td>**</td>
</tr>
</tbody>
</table>

Note: SE corresponding standard error of mean
$M_1 = M$ (high) − $M$ (moderate), $M_2 = M$ (high) − $M$ (low), $M_3 = M$ (moderate) − $M$ (low)
3.3.3.2 Degree of enthusiasm for going to the beach and gender

The overall proportion of the three groups with varying degrees of enthusiasm for going to the beach in the case of the 104 males was as follows: There were 31 participants in the high enthusiasm group (30%), 44 participants in the moderate enthusiasm group (42%), and 29 participants in the low enthusiasm group (28%). For the 76 females, there were 35 participants in the high enthusiasm group (46%), 22 participants in the moderate enthusiasm group (29%), and 19 participants in the low enthusiasm group (25%).

Table 3.2 and Table 3.3 present the results pertaining to the association between gender and moods/mental health, and gender along with the effects of the gender-based differences in three levels of enthusiasm for going to the beach on mood and mental health. In the case of men, there were strong significant differences ($p < .01$) on fatigue, depressive mood, refreshed mood, GHQ-12 scores, and significant difference ($p < .05$) on anxious mood subscale. With regard to the mean tension and excitement ($p = 0.097$) there was no significant difference. Furthermore, the data in Table 3.3 show significant differences ($p < .05$) with regard to the effects of enthusiasm for going to the beach on fatigue, anxious mood, refreshed mood, GHQ-12 scores, and the depressive mood ($p < .01$) between the high and moderate enthusiasm groups. There was a greater effect of enthusiasm for going to the beach for refreshed mood and GHQ-12 scores in the case of the high-low enthusiasm group ($p < .01$) compared to the high-moderate enthusiasm group ($p < .05$).

For women, the only significant differences ($p < .05$) were with regard to
the depressive mood and anxious mood subscales. With regard to the tension and excitement ($p = 0.072$), fatigue ($p = 0.586$), refreshed mood ($p = 0.640$), and GHQ-12 ($p = 0.676$) were no significant differences. Moreover, in Table 3.4, there were only significant differences ($p < .05$) on the depressive mood between the high and low enthusiasm groups, and the anxious mood between the moderate and low enthusiasm groups. The analysis of the scores in the high-moderate, high-low, and moderate-low enthusiasm groups revealed no significant differences for tension and excitement, fatigue, refreshed mood, and GHQ-12 scores. However, the changes in scores for tension and excitement and fatigue, and on the GHQ-12 showed an ascending trend, and the changes in scores on refreshed mood showed a descending trend as the degree of enthusiasm decreased (indicating higher enthusiasm for going to the beach had a positive impact on tension and excitement, fatigue, refreshed mood, and the GHQ-12 scores).

The above results show that the degree of enthusiasm for going to the beach affected males’ mood and mental health much more than it affected females’ mood and mental health. In the case of depressive mood and anxious mood, for males and females from all the three groups, enthusiasm for going to the beach had a significant effect. This survey suggests that a beach environment results in improving mood and mental health in men more than it does in women.
Table 3.2  Associations between gender and moods/mental health
(* p < .05, ** p < .01)

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>p</td>
<td>F</td>
<td>p</td>
</tr>
<tr>
<td>Tension and excitement</td>
<td>2.41</td>
<td>0.10</td>
<td>2.70</td>
<td>0.07</td>
</tr>
<tr>
<td>Fatigue</td>
<td>5.65 **</td>
<td></td>
<td>0.54</td>
<td>0.59</td>
</tr>
<tr>
<td>Depressive mood</td>
<td>7.62 **</td>
<td></td>
<td>2.94</td>
<td>*</td>
</tr>
<tr>
<td>Anxious mood</td>
<td>3.29 *</td>
<td></td>
<td>3.67</td>
<td>*</td>
</tr>
<tr>
<td>Refreshed mood</td>
<td>6.25 **</td>
<td></td>
<td>0.45</td>
<td>0.64</td>
</tr>
<tr>
<td>GHQ-12</td>
<td>9.55 **</td>
<td></td>
<td>0.39</td>
<td>0.68</td>
</tr>
</tbody>
</table>

Note: F corresponding F-test statistics
Table 3.3  Three varying degrees of enthusiasm for beach-going and males/females
Means, SE, and $p$ -values from the ANOVA and Tukey HSD post-hoc analysis
(* $p < .05$, ** $p < .01$ )

<table>
<thead>
<tr>
<th>Subscales</th>
<th>high-moderate</th>
<th></th>
<th></th>
<th>mod</th>
<th>SE3</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M_1$</td>
<td>$SE_1$</td>
<td>$p$</td>
<td>$M_2$</td>
<td>$SE_2$</td>
<td>$p$</td>
<td>$M_3$</td>
</tr>
<tr>
<td>Tension and excitement</td>
<td>0.05</td>
<td>0.15</td>
<td>0.94</td>
<td>0.33</td>
<td>0.15</td>
<td>0.09</td>
<td>0.28</td>
</tr>
<tr>
<td>Fatigue</td>
<td>-0.50</td>
<td>0.15</td>
<td>**</td>
<td>-0.16</td>
<td>0.16</td>
<td>0.57</td>
<td>0.34</td>
</tr>
<tr>
<td>Depressive mood</td>
<td>-0.53</td>
<td>0.14</td>
<td>**</td>
<td>-0.25</td>
<td>0.14</td>
<td>0.21</td>
<td>0.29</td>
</tr>
<tr>
<td>Anxious mood</td>
<td>-0.45</td>
<td>0.18</td>
<td>*</td>
<td>-0.26</td>
<td>0.19</td>
<td>0.37</td>
<td>0.20</td>
</tr>
<tr>
<td>Refreshed mood</td>
<td>0.41</td>
<td>0.21</td>
<td>*</td>
<td>0.76</td>
<td>0.22</td>
<td>**</td>
<td>0.42</td>
</tr>
<tr>
<td>GHQ-12</td>
<td>-0.42</td>
<td>0.96</td>
<td>*</td>
<td>-0.42</td>
<td>0.10</td>
<td>**</td>
<td>-0.14</td>
</tr>
</tbody>
</table>

|                       | $M_1$         | $SE_1$   | $p$      | $M_2$ | $SE_2$ | $p$      | $M_3$    | $SE_3$ | $p$ |
| Tension and excitement| -0.02         | 0.12     | 0.99     | -0.26 | 0.13 | 0.11     | -0.24    | 0.12   | 0.10 |
| Fatigue               | 0.09          | 0.12     | 0.73     | -0.03 | 0.13 | 0.98     | -0.12    | 0.12   | 0.61 |
| Depressive mood       | -0.03         | 0.13     | 0.96     | -0.30 | 0.13 | *        | -0.27    | 0.13   | 0.10 |
| Anxious mood          | 0.11          | 0.14     | 0.71     | -0.28 | 0.16 | 0.18     | -0.39    | 0.15   | ** |
| Refreshed mood        | 0.01          | 0.16     | 1.00     | 0.15  | 0.17 | 0.68     | 0.13     | 0.16   | 0.69 |
| GHQ-12                | 0.03          | 0.08     | 0.93     | -0.04 | 0.08 | 0.88     | -0.69    | 0.08   | 0.65 |

Note: SE corresponding standard error of mean
$M_1 = M$ (high) – $M$ (moderate), $M_2 = M$ (high) – $M$ (low), $M_3 = M$ (moderate) – $M$ (low)
3.3.4 Discussion

3.3.4.1 Impact of beach environment on mood and mental health

In this study, the participants were categorized into three groups (low enthusiasm group, moderate enthusiasm group, and high enthusiasm group) based on their enthusiasm for going to the beach. In order to compare the mood inventory and GHQ-12 questionnaire scores of the participants from all the three groups. The statistical analysis showed that there was the greatest difference between the minimum and maximum values of the mood and mental health scores in the case of the groups with high and low enthusiasm for going to the beach, and there was only a slight difference between the high and moderate enthusiasm groups, and moderate and low enthusiasm groups. The high enthusiasm group differed significantly with regard to its good or bad mood rating and mental health-related items; the participants with high enthusiasm for going to the beach showed improved mood and mental health. In addition, the groups with a lower enthusiasm for going to the beach rated themselves as significantly weaker than did the high enthusiasm group, on the depressive mood, anxious mood, and refreshed mood subscales as well as the GHQ-12. There was no difference between the low, moderate, and high enthusiasm groups with regard to fatigue, and tension and excitement subscale scores.

These results indicate that beach-going frequency should predict the actual mood and mental health status of Japanese people. The beach environment significantly improved the mental health and moods (depressed, anxious, and refreshed) of Japanese people. The improvement in mood after exposure to
beach environments was higher than the improvement in mood after exposure to non-beach environments. However, there are subtle moods such as tension and excitement and fatigue, which did not improve mood scores in the three groups impacted by the beach in this short-term study. People in a pleasant environment tend to be in a better mood and recall happier personal memories; they are also more optimistic, have better mental health, and exercise more. The elements of a beach scene, namely, the pleasant blue sea, soft sand, and warm sunshine can reduce feelings of depression and anxiety, and enhance the feeling of being refreshed. Many studies have shown that physical activities have been promoted as a method for improving mood and mental health in individuals\textsuperscript{14, 15}. Beach activities such as swimming, surfing, and boating are extremely popular among many people. Many people go to the beach to play beach sports, and this may be one of the reasons that people with a higher level of enthusiasm for going to the beach have a better mood and mental health than those who have a lower level of enthusiasm. In this study, it has been confirmed that a beach environment enhances mental health benefits, and helps reduce the intensity of poor moods. The improved mood and enhanced mental health experienced by Japanese people, on account of going to the beach has the potential to produce additional psychological and behavioral changes that may further enhance a feeling of well-being.
Figure 3.5 Mean scores for moods and mental health influenced by the three degrees of enthusiasm for going to the beach
3.3.4.2 Influence of beach and gender on mood and mental health

In particular, significant gender-based differences were also observed in the prevalence of mood status and GHQ-12 scores among the three groups with varying degrees of enthusiasm for going to the beach. The male-to-female ratio of the prevalence of mood and mental health status was significant and high. In the case of the two questionnaires administered to 180 general participants, for the males, the low enthusiasm, moderate enthusiasm, and high enthusiasm groups showed a greater difference in terms of fatigue, depressive mood, anxious mood, refreshed mood, and GHQ-12 scores. In the case of women, only depressive mood and anxious mood scores were significantly different across the three groups. This finding suggests that male Japanese people tend to have a more positive mood and better mental health, which were influenced by the beach environment, compared to the case of females in the Japanese general population.

The main finding of this study was that a beach environment could improve males’ mood and mental health across the three groups much more than it could in the case of the females. For men, going to the beach significantly generated a better mood, reduced feelings of fatigue and depression, and enhanced a refreshed mood and mental health performance. For the women, going to the beach only significantly lowered depressive and anxious mood scores. These results suggest that special attention should be paid to the fact that going to a beach does not greatly influence the mood and mental health of Japanese females. This finding, that beach-going seldom improves females’
mood and mental health, may be due to several factors.

First, the fact that a large number of women are full-time housewives in Japan who are busy raising children, doing housework and so on, may result in a decline in women’s mood. The lack of a significant effect of the beach environment on females was probably due to the fact that among the female beach-goers, the ratio of those who outsourced their housework was high. Further, some factors like fatigue, irritability, and weight gain can be attributed to quality of life problems. Women who go to beaches and those who do not face considerable conflict and stress with regard to caring for their families and are unable to relax and enjoy being at the beach for an entire day. In conclusion, a comparison of the stress and mental health disorder ratings of females with those of males suggests that the moods and mental health of females tend to be poorer. That is, females find it difficult to unwind and let go even when on a scenic and beautiful beach.

Second, women dislike the sun’s ultraviolet rays, and to avoid the same, they prefer to stay at home rather than go to the beach. As was found in this study, beach-going produced no consistent adverse mood or mental health effects in the case of women. Unlike women, men do not mind the sun’s ultraviolet rays, and they enjoy going to the beach rather than staying at home or working at their office.

Third, for men, the effect of the beach on moods and mental health were more positive than they were for women, and this difference was largely due to the fact that the men engaged in more beach activities such as fishing, swimming, and surfing, which improved their mental health and released their
stress. Men who enjoyed engaging in different types of beach activities had better scores with regard to depression, fatigue, and confusion-related factors, as well as mental health. When women, who did not engage in beach activities, were compared to their male counterparts, it was found that beach-going had a smaller effect on moods and mental health in the case of the former; however, the women had significant depression and anxious scores. This finding suggests that men and women need to engage in more beach activities.

Unlike the men in this study, the women in the three groups did not show a significant difference with regard to mood and mental health. However, a tendency was revealed for the women’s mood and mental health scores to change (indicating good mood and mental health) once at the beach. Therefore, both men and women enjoy the beach environment when they go to the beach.
Figure 3.6 Mean scores of males for moods and mental health influenced by the three degrees of enthusiasm for going to the beach.
Figure 3.7 Mean scores of females for moods and mental health influenced by the three degrees of enthusiasm for going to the beach.
3.3.5 Conclusion

In this study, measured and evaluated the effects of the beach environment on the mood by using a short version of the Mood Inventory, and on their mental health by using the GHQ-12 questionnaire. The participants were beach-goers on Azur Maiko beach, Kobe, Japan. Moreover, the males and females were divided into three groups, each group having a different degree of enthusiasm for going to the beach, and assessed all the participants’ mood and mental health. A significant gender difference was found with regard to the effects of the beach environment on mood and mental health. The results were as follows.

1. From among the three degrees of enthusiasm for going to a beach, a high degree of enthusiasm had the strongest significant effect on mood and mental health. In particular, the subscales measuring depressive mood, anxious mood, and refreshed mood, and the GHQ-12 showed that there were vast differences in scores among the three groups with varying degrees of enthusiasm. Therefore, it can be considered that the beach environment improves the mood and mental health of people.

2. The findings also indicate that in both men and women, the beach environment has a positive influence on mood and mental health. Furthermore, in men, there was a significant difference with regard to the mood inventory and GHQ-12 scores among the high, moderate, and low enthusiasm groups. Among the women, the difference among the three groups with regard to mood and mental health status was slight and almost not significant.

The issues and limitations of the present study should be addressed in
future research. As the participants were categorized into three groups, the number of participants in each group was small. Moreover, the degree of enthusiasm for going to the beach was an ambiguous, self-reported measure, and additional tests should be used to complement the self-reported measures. Further, additional comparisons based on factors such as age should be conducted, to determine whether the beach environment influences mood and mental health on the basis of age. Further testing including a broader range of factors related to beach-going would also be helpful to determine if beach-going has creative, distinctive effects on other factors. Further studies need to be done to compare more factors that are affected by the beach environment.

As mentioned earlier, the results of this study are highly significant and will provide a good reference point for studying the impact of the beach environment on mood and mental health. However, future study will need to develop and encourage beach-going in a way that is trustworthy and such that positive moods and mental health are promoted.
References


Chapter 4

Effects of Cutter Experience on Adolescents’ Abilities

4.1 Overview of nature experience

In order to contribute towards a healthy, emotionally enriched society, it is essential to nurture the youth mentally and physically, and to enhance their emotional education. As a guideline for education going forward, natural experience education is regarded as having the potential to elevate national educational standards. This paper discusses the effects of natural experience education on a cutter boat among adolescents. Previous researches have indicated that such experience has made a substantial contribution to achievements in experiential outdoor education1), 2). Gray and Perusco conducted outdoor education aimed at specific psychological and social outcomes3). The majority of such outcome studies have focused on camping educational programs, with outcomes examined by means of the IKIRU CHIKARA (IKR) inventory, reporting improvements in psychological and social, moral, and physical abilities4), 5), 6), 7), 8), 9). Outdoor educational activities, on both land and sea, have been successfully used over the years for their positive benefits among adolescents. Among the range of nautical outdoor education activities, sail training has been shown to provide more effective experiences in terms of various aspects of individual development and personality10), 11), 12).

This study was inspired by Japan’s status as a nation of shipping and
fisheries, with widespread interest in ocean-based lifestyles. Furthermore, the maritime nature of the research provided access to various kinds of boats, giving us unique opportunities to consider the effects of cutter training in education. The cutter boat is a standard type of boat that has traditionally been used as a lifeboat or contact boat, and is generally mounted on larger vessels. These boats generally use oars, but some are equipped with masts and sails. In addition, when rowing, unlike boats that can be operated by individuals, multiple members work together and cooperate to reach common goals and objectives in a cutter. Because of this, training with cutter boats improves the acquisition of teamwork and technical skills, and through the process of learning, also reduces maritime tensions and ensures safety.

Cutter training and sail training, two similar types of outdoor education, may have the same powerful educational effects on adolescents’ abilities. Until now, there has been a paucity of outcome studies focusing on cutter training for adolescents, and research on educational programs other than sail training are also lacking in variety and quality. The cutter boat training was suggested that has the potential to provide effective personal growth experiences for adolescents. Note too that cutter boat training has in recent years become recognized as an effective educational activity in Japan. People of all ages across the country, including those in elementary school, actively practice on cutter boats. Although cutter training has become an educational activity in Japan, it remains unclear what this has achieved. For the purposes of this study, propose the hypothesis that cutter experience can improve adolescents’ abilities.
In order to examine the effects of cutter experience on adolescents’ abilities in this study, used the IKR inventory. This self-report questionnaire was completed by participants before, immediately after, and one month after their cutter experience. It can be determined the relationship between the cutter experience and the participants' abilities, and determine any changes over time.

4.2 Methodology

4.2.1 Participants

A total of 199 Grade 1 junior high school students (121 males and 78 females) in Hiroshima participated in the cutter experience program that was the focus of this study. On average, participants 12.5 years old, have a golden period of time to foster adolescents’ abilities. All the participants had never experienced cutter boat before. The junior high school concerned was interested in finding ways to improve education aimed at developing individuality and competence through outdoor activities, and identified students who might require additional or specific life skill instruction. The cutter experience program was conducted at Tsuneishi Shimanami Village.

4.2.2 The IKR inventory

The IKR inventory, developed by Tachibana et al.\textsuperscript{13}, is a self-report questionnaire designed to determine the constituent characteristics of IKIRU CHIKARA (Zest for living) in outdoor educational program. It is aimed at detecting an increase in the desire for learning among adolescents that is
required for self-realization, as well as for meeting the demands of appropriate adaptation to social change. The IKR inventory consists of three ability scales, namely those targeting psychological and social abilities, moral abilities, and physical abilities. These types of ability are measured by means of 14 subscales, and each subscale comprises two items. In this study, cutter skills were included as one of the physical abilities. In order to measure the cutter skills developed by cutter experience, a new subscale (with two items) was created for the questionnaire. Concrete question items were collected to describe “cutter skills”, and then verified whether adolescents understood the question items or not in quantitative and qualitative analysis. As a result, the two items have been selected. The questionnaire has well enough reliability and validity. Thus, the IKR used here comprised 15 subscales. Seven subscales of the IKR measure psychological and social abilities: independence, positivity, cheerfulness, friendship-cooperation, actual affirmation, range of vision-judgment, and adaptable behavior. Moral abilities are measured by four subscales: self-regulation, concern with nature, diligence, and compassion. Finally, four subscales measure physical abilities: active behavior, physical tolerance, outdoor life-skills, and cutter skills (the latter having been added for purposes of the present study).

Participants were required to respond to each item on a Likert-type scale in which 1 = “Strongly Disagree,” 2 = “Disagree,” 3 = “Neither Agree nor Disagree,” 4 = “Agree,” and 5 = “Strongly Agree.” Each subscale was scored by taking the mean of the item responses. The questionnaire items are shown in Table 4.1.
### Table 4.1 Items in the IKR inventory

<table>
<thead>
<tr>
<th>Abilities measured</th>
<th>Subscales</th>
<th>Question items</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psychological and social abilities</strong></td>
<td>Independence</td>
<td>You can clearly refuse anything you hate. You are not afraid of making small mistakes.</td>
</tr>
<tr>
<td></td>
<td>Positivity</td>
<td>You can move forward and do your best in anything. You can actively consider everything.</td>
</tr>
<tr>
<td></td>
<td>Cheerfulness</td>
<td>You can talk to everyone. You can get over the shock of failure quickly.</td>
</tr>
<tr>
<td></td>
<td>Friendship-cooperation</td>
<td>You are loved by many people. You can get along with everyone.</td>
</tr>
<tr>
<td></td>
<td>Actual affirmation</td>
<td>You love yourself very much. You can greet everyone.</td>
</tr>
<tr>
<td></td>
<td>Range of vision-judgment</td>
<td>You can foresee events and make a plan by yourself. You can detect problems and issues by yourself.</td>
</tr>
<tr>
<td></td>
<td>Adaptable behavior</td>
<td>You can listen to people carefully. You can adapt to the occasion.</td>
</tr>
<tr>
<td><strong>Moral abilities</strong></td>
<td>Self-regulation</td>
<td>You are not selfish. You don’t waste money and things.</td>
</tr>
<tr>
<td></td>
<td>Concern with nature</td>
<td>You are impressed by beautiful scenery such as the sea. You can feel the changing of the seasons.</td>
</tr>
<tr>
<td></td>
<td>Diligence</td>
<td>You like to work very hard. You can do an assigned job well.</td>
</tr>
<tr>
<td></td>
<td>Compassion</td>
<td>You like doing things for people. You can understand other people’s pain.</td>
</tr>
<tr>
<td><strong>Physical abilities</strong></td>
<td>Active behavior</td>
<td>You can go to bed and wake up early. You don’t get tired from physical activity.</td>
</tr>
<tr>
<td></td>
<td>Physical tolerance</td>
<td>You don’t suffer from heat and cold. You can endure a serious injury.</td>
</tr>
<tr>
<td></td>
<td>Outdoor life-skills</td>
<td>You can use cutter tools, such as a knife, well. You can wash clothing by hand without a washing machine.</td>
</tr>
<tr>
<td></td>
<td>Cutter skills</td>
<td>You want to row a cutter boat. You have confidence in using the oar well.</td>
</tr>
</tbody>
</table>
4.2.3 Procedure

Each participant completed the IKR inventory immediately before (pre-test), directly after (post-test 1), and one month after the cutter experience (post-test 2). The three testing times were carried out by using the same questionnaire. During the cutter experience, all the participants divided into groups to row cutter boats. The coach taught them how to use the oar well, how to cooperate with each other, and so on. The pre-test was designed to measure participants “zest for living” and to establish a base line before the cutter experience. Post-test 1 aimed to determine the effects of engagement with the cutter training, i.e., the results of the cutter experience program. The final survey, post-test 2 aimed to verify whether any positive effects continued one month after the cutter experience. We extrapolated from the distributions found in the pre-test and post-test 1 (i.e., determining the short term effect of the cutter experience), and also from those in the pre-test and post-test 2 (i.e., determining persistent effects of the cutter experience). To encourage the adolescent participants to answer truthfully, emphasized that their responses would be confidential, and would be analyzed collectively rather than individually. Participants were also told that there were no right or wrong answers to any of the items, and that honest responses were of great importance.

<table>
<thead>
<tr>
<th>Table 4.2  The timing of the IKR inventory tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test date</td>
</tr>
<tr>
<td>Post 1-test date</td>
</tr>
<tr>
<td>Post 2-test date</td>
</tr>
</tbody>
</table>
4.2.4 Statistical analysis

Questionnaires with missing or incomplete data were excluded from analysis, and data were entered and analyzed using the Statistical Package for Social Sciences (SPSS, 2007) software. A one-way analysis of variance (ANOVA) and Tukey HSD post-hoc analysis for multiple comparison were conducted in order to summarize and interpret the descriptive data. Initially, descriptive analyses (Mean [M], Standard Error [SE], p-value [p]) were conducted to explore differences among the IKR subscales and to compare the results among the pre-test and post-tests. The statistical significance level is set at $p < .05$, $p < .01$.

4.3 Results

The survey in this study gathered information on participants’ psychological and social abilities (independence, positivity, cheerfulness, friendship-cooperation, actual affirmation, range of vision-judgment, and adaptable behavior), moral abilities (self-regulation, concern with nature, diligence, and compassion), and physical abilities (active behavior, physical tolerance, outdoor life-skills, and cutter skills) at three points in time, namely before the cutter experience, immediately after the cutter experience, and one month after the cutter experience. The results are discussed below.
4.3.1 Psychological and social abilities across testing times

In terms of the independence subscale, the mean scores show an ascending trend in the pre-test and post-test 1, and the pre-test and post-test 2, but there were no significant differences across testing times. The data suggests that the independence subscale had no positive affect on the psychological and social abilities of the participants. (Figure 4.1)

![Independence](image)

**Figure 4.1** Mean scores for independence in the pre-test and post-tests 1 and 2

(* $p < .05$, ** $p < .01$)
In terms of the positivity subscale, it shows a significant increase \((p < .05)\) between the pre-test and post-test 1, i.e., before and immediately after the cutter experience. Moreover, by analyzing the persistence of the effects, I found that the positivity subscale also showed a significant change between the pre-test and post-test 2, i.e., from before the experience to one month after the experience. It is worth noting that the positivity subscale also had an effect on the psychological and social abilities of the participants. (Figure 4.2)

![Positivity Chart](image)

**Figure 4.2** Mean scores for positivity in the pre-test and post-tests 1 and 2

\(* p < .05, ** p < .01\)
In terms of the cheerfulness subscale, there was no significant difference between participants’ scores for the pre-test and post-test 1 ($p = .472$). However, cheerfulness did increase slightly and significantly between pre-test and post-test 2 ($p < .05$). The data suggests that the cheerfulness subscale continued to show an increase in psychological and social abilities one month after the cutter boat experience. (Figure 4.3)

![Cheerfulness Graph]

**Figure 4.3** Mean scores for cheerfulness in the pre-test and post-tests 1 and 2

(* $p < .05$, ** $p < .01$)
In terms of the friendship-cooperation subscale, the mean scores show an ascending trend in the pre-test and post-test 1, and the pre-test and post-test 2, but there were no significant differences across testing times. The data suggests that the friendship-cooperation subscale had no positive affect on the psychological and social abilities of the participants. (Figure 4.4)

![Friendship-Cooperation](image)

**Figure 4.4** Mean scores for friendship-cooperation in the pre-test and post-tests 1 and 2  
(*p < .05, **p < .01)
In terms of the actual affirmation subscale, the mean scores show an ascending trend in the pre-test and post-test 1, and the pre-test and post-test 2, but there were no significant differences across testing times. The data suggests that the actual affirmation subscale had no positive affect on the psychological and social abilities of the participants. (Figure 4.5)

![Actual affirmation chart](image)

**Figure 4.5** Mean scores for actual affirmation in the pre-test and post-tests 1 and 2

(* $p < .05$, ** $p < .01$)
In terms of the range of vision-judgment subscale, the mean scores show an ascending trend in the pre-test and post-test 1, and the pre-test and post-test 2, furthermore, there was a strong increase ($p < .01$) in the pre-test and post-test 1, and the pre-test and post-test 2. It is important to note that only the range of vision-judgment subscale showed a strong significant increase in psychological and social abilities between post-tests 1 and 2. (Figure 4.6)

![Range of Vison-Judgment](image)

**Figure 4.6** Mean scores for range of vision-judgment in the pre-test and post-tests 1 and 2
(* $p < .05$, ** $p < .01$)

In terms of the adaptable behavior subscale, there was a strong increase ($p$
< .01) between the pre-test and post-test 1, i.e., before and immediately after
the cutter experience. One month after the cutter experience, showed a
significant increase (p < .05) between the pre-test and post-test 2. I identified
that the adaptable behavior subscale positively affected the psychological and
social abilities of the participants immediately after the cutter experience.
(Figure 4.7)

![Adaptable behavior chart](image)

Figure 4.7 Mean scores for adaptable behavior
in the pre-test and post-tests 1 and 2
(* p < .05, ** p < .01)

Variations in participants’ scores across time were evident for the positivity,
range of vision-judgment, and adaptable behavior subscales. These findings
suggest that the immediate effect of the cutter experience on the participants’
psychological and social abilities were reflected by improvements in terms of
positivity, range of vision-judgment, and adaptable behavior, which persisted
even after one month following the experience.
4.3.2 Moral abilities across testing times

In terms of the self-regulation subscale, strong significant positive change ($p < .01$) was found between the pre-test and post-test 1. However, the increase in the mean scores for self-regulation was not significant between the pre-test and post-test 2. (Figure 4.8)

![Bar chart showing self-regulation scores](Image)

**Figure 4.8** Mean scores for self-regulation in the pre-test and post-tests 1 and 2

(* $p < .05$, ** $p < .01$)
In terms of the concern with nature subscale, a significant positive difference ($p < .05$) between the pre-test and post-test 1 was present. Whereas despite an ascending trend for the concern with nature subscale between the pre-test and post-test 2, the increase in the mean scores was not significant. (Figure 4.9)

![Bar graph showing concern with nature scores](image)

**Figure 4.9** Mean scores for concern with nature in the pre-test and post-tests 1 and 2

(* $p < .05$, ** $p < .01$)
In terms of the diligence subscale, it showed greater increase ($p < .01$) between the pre-test and post-test 1 than it did between the pre-test and post-test 2 ($p < .05$). (Figure 4.10)

![Diligence Graph](image)

Figure 4.10 Mean scores for diligence in the pre-test and post-tests 1 and 2

($* p < .05$, $** p < .01$)
In terms of the compassion subscale, it showed a positive significant change ($p < .05$) between the pre-test and post-test 1, and also showed a continued significant change ($p < .05$), one month after the experience. The mean scores for most subscales were lower at post-test 2 than at post-test 1, but the mean score for compassion was higher at post-test 2 ($M = 3.54$) than at post-test 1 ($M = 3.53$). Thus, compassion subscale increased the most between the pre-test and post-tests. (Figure 4.11)

![Compassion Chart](image)

**Figure 4.11** Mean scores for compassion in the pre-test and post-tests 1 and 2

(* $p < .05$, ** $p < .01$)

The above results show that the cutter experience affected participants’ moral abilities in terms of self-regulation, concern with nature, diligence, and compassion, but the effects on self-regulation and concern with nature decreased after one month, whereas the remaining two subscales retained the positive effects of the cutter experience.
4.3.3 Physical abilities across testing times

In terms of the active behavior subscale, there was strong positive significant change \((p < .01)\) between the pre-test and post-test 1. Analysis of the scores in pre-test and post-test 2 showed no significant difference. (Figure 4.12)

![Active behavior chart]

Figure 4.12  Mean scores for active behavior in the pre-test and post-tests 1 and 2
\((* p < .05, ** p < .01)\)
In terms of the physical tolerance subscale, there was a strong positive significant change ($p < .05$) in scores between the pre-test and post-test 1. However, the increase in the mean scores for physical tolerance was not significant between the pre-test and post-test 2. (Figure 4.13)

**Physical tolerance**

![Figure 4.13 Mean scores for physical tolerance in the pre-test and post-tests 1 and 2 (*) $p < .05$, **$p < .01$)
In terms of the outdoor life-skills subscale, showed only a positive significant difference \((p < .05)\) between the pre-test and post-test 1, but there was no significant difference between the pre-test and post-test 2. (Figure 4.14)

![Outdoor life-skills diagram](image)

**Figure 4.14** Mean scores for outdoor life-skills in the pre-test and post-tests 1 and 2
\((* p < .05, ** p < .01)\)
In terms of the cutter skills subscale, there were no significant differences, between either the pre-test and post-test 1 or between the pre-test and post-test 2. (Figure 4.15)

![Cutter skills graph]

This results show that the immediate effect of the cutter experience on participants’ physical abilities were positive in terms of active behavior, physical tolerance, and outdoor life-skills, whereas the effects didn’t persist after one month following the cutter boat experience.
4.4 Discussion

4.4.1 Short term effects of the cutter experience

All of the 15 subscales showed an increase from before to just after the cutter experience, and these results are summarized in Table 4.3. Ten of the IKR inventory subscales, namely positivity, range of vision-judgment, adaptable behavior, self-regulation, concern with nature, diligence, compassion, active behavior, physical tolerance, and outdoor life-skills, showed significant increases between pre-test and post-test 1. In addition, highly significant increases ($p < .01$) were found for certain psychological and social abilities subscales (range of vision-judgment and adaptable behavior), certain moral abilities subscales (self-regulation and diligence), and the physical abilities subscales (active behavior and physical tolerance). Therefore, the cutter boat experience improved the psychological-social, moral, and physical abilities of the participants.

Even a brief cutter experience could have a marked positive short term effect on adolescents. When the present participants undertook the cutter experience, they immediately realized that it was a group activity, and this led them to adapt their behavior for training on the cutter boat with the other participants. Often, the participants had followed extracurricular activities, such as painting, web work and so on, other than cutter training which was transferrable to the outdoor environment. With this change in educational activity, the participants’ range of vision and judgment improved. Moreover, in order to achieve goals on the cutter boat, they not only had to cooperate with others, but also develop an inner desire for progress. Such characteristics
of the training caused the participants to learn self-regulation and diligence in their maturation and growth. Because it was not easy to row the cutter boat, the participants needed to build up their physical strength, active behaviors, and physical tolerance, which all improved through the cutter experience. The cutter skills needed for rowing were not shown to improve significantly in this study, as the mean scores tended to remain consistent. As the study covered only one cutter experience with limited training time, further research is needed in this regard. It is also noteworthy that the friendship-cooperation subscale did not reflect significant improvement. However, participants were observed to strengthen their unity, friendship, and cooperation with their peers during the cutter experience. This may be due to their lack of previous cutter experience. However after the cutter experience, an ascending trend was noted in scores, and so it is assumed that the experience did have a slight effect on friendship-cooperation abilities.

In sum, the findings reveal that the participants improved in terms of their psychological and social, moral, and physical abilities through the short term cutter experience in this study.

### 4.4.2 Persistent effects of the cutter experience

For of IKR subscales in this study, a descending trend occurred between post-tests 1 and 2, immediately following and one month after the cutter experience. However, an ascending trend occurred between the pre-test and post-test 2, i.e., from before to one month after the cutter experience. In the comparison of scores, the psychological and social abilities of positivity,
cheerfulness, range of vision-judgment, and adaptable behavior, as well as
the moral abilities of diligence and compassion, showed significant
differences between the pre-test and post-test 2. With respect to these six
subscales, with the exception of cheerfulness, also showed a significant
difference between the pre-test and post-test 1. Furthermore, physical
abilities improved significantly from before to immediately after the
experience, but there were no significant increases remaining one month later.
Thus, psychological and social, and moral abilities showed continued positive
effects even one month after the cutter experience, particularly in terms of
the subscales for positivity, range of vision-judgment, adaptable behavior,
diligence, and compassion, all improving significantly among the adolescents
in this study.

The contextual analysis of the IKR inventory reveals that the significance
of the effects of the cutter experience was temporary, and had faded away by
one month after the cutter experience. Once the participants had gone back to
their daily lives and reverted to their previous educational circumstances,
following the cutter experience, they had limited contact with nature. Moreover, the lack of cutter experience following the program may also
partially explain the observed decrease in self-regulation and concern with
nature. The participants achieved remarkable success in active behaviors,
physical tolerance, and outdoor life-skills during the cutter experience, but
after one month, it was to be expected that these effects did not persist. The
developmental power of the positivity and compassion experienced through
the cutter boat experience, a group activity program, presented more positive
effects on development, even after one month. In terms of cheerfulness, we assume that the participants perceived some other social requirements in their daily lives one month after the cutter experience. The effect of the cutter experience appears to have had repercussions for cheerfulness.

Addressing the descending trends found in this study, a clear decrease in physical abilities was noted one month after the cutter experience. However, post-test 1 showed an ascending change from pre-test, and the same slight ascending change was also found between pre-test and post-test 2. There was also a trend towards improvement in the participants’ zest for living. A good cutter experience could thus have persistent positive effects on adolescents, extending beyond the short term.

4.4.3 Suitability of a cutter experience for adolescents

In the cutter experience program, each participant created a strong relationship with other peers, and compassion, positivity, and diligence grew rapidly. Psychological and social abilities, as well as moral abilities, featured in this cutter experience project. The individual participants’ perceived ability to perform various activities in this nautical environment was evident. On the cutter boat, each participant was experientially engaged in several moral activities, which provided opportunities to independently explore new roles and possibilities of functioning, while being actively in control of their own actions and outcomes. The confined environment allowed participants to receive immediate and often positive regard from others. The above-mentioned aspects presented themselves repeatedly in the environment of the
cutter boat, significantly improving psychological and social, as well as moral abilities. However, the need for physical abilities disappeared once the participants were back home.

The cutter boat experience, a group outdoor education project, required all participants to work together and help each other. The collective action of the participants, and their exchanges with peers, are special characteristics that promote community networks between schools, families, and social groups. Moreover the cutter boat experience deepened participants’ interest in the nature of the sea. The educational effects of the cutter boat experience appear to have met their purposes, and had a nurturing effect on the participants.
Table 4.3 Mean, SE, and $p$-values from ANOVA and Tukey HSD post-hoc analysis
(* $p < .05$, ** $p < .01$)

<table>
<thead>
<tr>
<th>Abilities measured</th>
<th>Subscales</th>
<th>Pre-test – Post-test 1</th>
<th>Pre-test – Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$M_1$</td>
<td>SE$_1$</td>
</tr>
<tr>
<td>Psychological and social abilities</td>
<td>Independence</td>
<td>-0.22</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>Positivity</td>
<td>-0.25</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>Cheerfulness</td>
<td>-0.13</td>
<td>0.11</td>
</tr>
<tr>
<td>Psychological and social abilities</td>
<td>Friendship-cooperation</td>
<td>-0.14</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>Actual affirmation</td>
<td>-0.17</td>
<td>0.09</td>
</tr>
<tr>
<td>Psychological and social abilities</td>
<td>Range of vision-judgment</td>
<td>-0.38</td>
<td>0.09</td>
</tr>
<tr>
<td>Psychological and social abilities</td>
<td>Adaptable behavior</td>
<td>-0.38</td>
<td>0.09</td>
</tr>
<tr>
<td>Moral abilities</td>
<td>Self-regulation</td>
<td>-0.28</td>
<td>0.09</td>
</tr>
<tr>
<td>Moral abilities</td>
<td>Concern with nature</td>
<td>-0.28</td>
<td>0.10</td>
</tr>
<tr>
<td>Moral abilities</td>
<td>Diligence</td>
<td>-0.30</td>
<td>0.09</td>
</tr>
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<td>Moral abilities</td>
<td>Compassion</td>
<td>-0.19</td>
<td>0.08</td>
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<tr>
<td>Physical abilities</td>
<td>Active behavior</td>
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<td>0.11</td>
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<tr>
<td>Physical abilities</td>
<td>Physical tolerance</td>
<td>-0.39</td>
<td>0.10</td>
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<tr>
<td>Physical abilities</td>
<td>Outdoor life-skills</td>
<td>-0.29</td>
<td>0.11</td>
</tr>
<tr>
<td>Physical abilities</td>
<td>Cutter skills</td>
<td>-0.02</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Note: SE corresponding standard error of mean
4.5 Conclusion

In this study, the original hypothesis was that cutter experience can improve adolescents’ abilities. A “Zest for Living” questionnaire survey was conducted among 199 Hiroshima junior high school first grade students at three points in time. The following results were obtained:

1. The three types of abilities reflected by the IKR showed significant change. Therefore, the cutter experience may be regarded as having improved the abilities of adolescents. However, for certain subscales, abilities decreased a little after one month.

2. The cutter experience led to improvements in the psychological and social, moral, and physical abilities of the participants. In particular, the psychological-social, and moral abilities showed persistent positive effects even one month after the cutter experience.

3. The subscales for positivity, adaptable behavior, range of vision-judgment, diligence, and compassion all reflected vast improvements among the participants in this study.

Japan is a maritime nation that benefits from the sea that surrounds it on all sides. “To learn the sea” and “to learn in the sea” are paradigms that differ from everyday life in some countries. Adolescents in Japan are provided opportunities for contact with the marine environment in order to enhance their abilities to adapt and to cooperate with one another, and so on. Cutter boat experience programs are activity-based with natural experiences for adolescents. At the outset of this study is proposed that the cutter experience would raise the ability levels of the participants. This study suggest that cutter
experience, as an educational practice, would be adaptable to school aims regarding nature and could function as one of the leading models for natural experience education. Moreover, cutter boat is a kind of marine sport, the basic education program of seamanship. Not only are regular experiences in nature, but also cultivate adolescents’ lifelong interest and deepen adolescents’ sense of maritime life.

In recent years, many seaside schools have, in actual fact, reduced the importance of natural experiences for students. This study propose that students be made to jump out of the classroom, escape from normal classes, and be presented with opportunities to increase their ability to use knowledge for practical purposes through mutual cooperation among schools, families, and communities.
References


8) Kanda, R., & Satoh, K.: Changes experienced by children in organized


Chapter 5

Conclusions and Future study

In this paper, discern three levels of engagement with coastal natural environment:

(1) The first level is viewing coastal environments from a distance, perhaps from a window or through reading a book.

(2) The second is a temporary experience of a natural coastal environment, through incidental exposure, such as sunbathing, or going to the beach.

(3) The third is direct participation with a natural coastal environment, such as swimming, surfing, or boating.

On the basis of these three levels of engagement with a natural coastal environment, investigate the effects of the three levels of engagement on human well-being in Chapter 2, Chapter 3, and Chapter 4 respectively.

Chapter 2, evaluates the first level of engagement, that of viewing the coastal environment through a medium such as a window from homes, to see if it has an effect on human well-being and examine the differences based on gender and age. A residential housing area was selected in Hyogo Prefecture in Japan as the survey site, and administered a psychological effects questionnaire to 518 respondents from two groups: those with ocean views from their homes, and those without. The findings showed that: (1) Compared to residents who lived inland, those who lived near the ocean showed higher positive psychological effects and had lower negative psychological effects.
Coastal environments exerted significant influence on both males and females; however, the positive effects were stronger for females than males. At the same time, the negative impacts were weaker for females than males. The younger, middle-aged, and elderly groups living near the coast experienced more positive effects than those living in non-coastal areas. The positive consequences of exposure to the ocean were strongest for the elderly group. Different frequencies of ocean views also has a psychological effect on individuals, as the frequencies of the viewings increase, the benefits also increase. Furthermore, high frequency sea viewing was more beneficial in terms of psychological effects for both men and women, than those with medium or low frequency sea viewing. These results suggest that viewing coastal environments positively affects individual well-being.

Chapter 3, evaluates the second level of engagement, incidental exposure to a natural coastal environment, to see whether beach-going affects the mood and mental health of Japanese people, and to examine gender-based differences with regard to these effects of beach-going. The data were randomly selected from 181 people in Japan (however in Study 2 used data from only 180, because one set of data was incomplete). Both a short version of Sakano et al.’s Mood Inventory was used to measure tension and excitement, fatigue, depressive, anxious, and refreshed moods; and the General Health Questionnaire (GHQ-12) to measure mental health in Study 2. In Study 1, only used GHQ-12 questionnaire. Chapter 3 examines two aspects of exposure to a beachfront that help us to understand what influences they have on human well-being. Study 1: frequencies of beach-going and its effects
on mental health; Study 2: degrees of enthusiasm for beach-going and its
effect on mood and mental health.

In Study 1, all the participants categorized into three groups according to
different frequencies (high, medium, and low) of going to the beach
completed the GHQ-12. Subjects with high frequency of going to the beach
show a significant difference in mental health when compared to medium and
low frequencies. The high frequency of going to the beach group had a higher
significant influence on both males and females than the lower frequency
group. Beach-going frequencies had a stronger significant correlation for
male’s mental health than for females. Furthermore, respondents in their teens,
twenties, thirties, and forties also show a significant difference when
compared to the other two frequencies. Particularly, the impact of the beach
environment on teens and respondents in their twenties shows a higher
difference than on those in their thirties and forties. These findings indicate
that the beach environment is strongly related to human mental health, and
that males and young people are more likely to be affected positively in this
regard.

In Study 2, based on the participants’ degree of enthusiasm for going to the
beach, they were categorized into three groups: high enthusiasm, moderate
enthusiasm, and low enthusiasm. The findings of this study showed that (1) a
high degree of enthusiasm for beach-going had a greater significant effect on
mood and mental health than either moderate or low degrees of enthusiasm.
There were vast differences in scores on the subscales assessing depressive
mood, anxious mood, and refreshed mood, and the GHQ-12 scores, among the
three groups, and (2) for males, the differences in the mood inventory and GHQ-12 scores among the three groups, high, moderate, and low enthusiasm were more pronounced and significant than they were for females. Although the females did not differ much in terms of the quality of their mood and mental health status, there was a slight difference among the three groups. These results suggest that especially for Japanese males, the beach has a great influence on improving mood and mental health.

Chapter 4 investigates the third level of engagement of direct participation with a natural coastal environment, through a cutter boat experience (a kind of coastal nature experience) to see if it has an effect on adolescents’ abilities. Data were collected by means of the IKIRU CHIKARA (IKR) (Zest for Living) inventory among 199 junior high school students at three points in time, before the cutter boat experience, directly after the cutter boat experience, and one month after the cutter boat experience. The IKR inventory targets three categories of ability, namely psychological and social ability, moral ability, and physical ability, which are measured on the basis of 14 subscales, each comprised of two items. The findings of this study showed: (1) The cutter experience improved the abilities of participants. However, depending on the subscale used, after one month, abilities had decreased somewhat. (2) The cutter experience program had a highly positive effect on the psychological and social, as well as the moral abilities of the participants. (3) The subscales targeting positivity, adaptable behavior, range of vision-judgment, diligence, and compassion showed vast improvement among the participants. The results suggest that the cutter boat experience had a
substantial influence on improving the overall abilities of adolescents.

In coastal natural environment and human well-being, the positive effects pervades a number of academic disciplines, but it is not confined to the academic realm. On 11 March 2011, a 9.0 magnitude earthquake off the north-eastern coast of Japan, resulted in massive loss of life, physical damage, and environmental contamination. Furthermore, victims of tsunami events often suffer psychological problems which can last for a long time, or an entire lifetime. This paper describes the coastal nature experience impacts of human well-being and highlights the interconnectedness among the core areas of well-being including mood, mental health, abilities and so on. Perhaps this article will provide an overview of the coastal environment positive impact to the human beings, and deal with the psychological upset caused by natural disaster.

This paper has been written not only for fellow coastal environmental studies, but also for the young people, especially for the students of the Maritime. It is intended even more broadly for young people interested in Maritime Science and the centrality of the coast natural environment to our everyday lives. Although the theory developed is not restricted in its applicability to the circumstances facing maritime education, among the current problems Japan have prompted concerns over the dilemmas facing the rapid decline in Maritime students. The feature of “effects of coastal nature experience on human well-being” is essential to attract and hold the attention of much more students of ocean development.

This paper contributes to the ongoing analysis of the nature experience
especially in regard to the coast and its effect on human well-being. However, the present research has a number of limitations which, although recognized, suggest avenues for future research. The following are some interesting research topics which may be worthy of further investigation:

(1) Coastal nature experiences, in the present study, were generally found to have relatively positive influences on human well-being. Consequently, usage of the coastal nature experience to improve human well-being, such as establishing psychological treatment facilities on or near the coast would be an important next step.

(2) The examination of the effect of coastal experiences used a relatively simple method of varying questionnaires given to examine a number of different situations where well-being of coastal nature experience could be expected. More comprehensive methods, such as video recordings and in situ experiments, will be needed to confirm people’s reactions to coastal environments.

(3) Japan is a special island nation that benefits from the sea that surrounds it on all sides. This may be one reason that coastal nature experiences have positive effects on Japanese well-being in my study. In further future research, could contrast this with people from some other countries, such as Chinese, American, or African, to see whether coastal nature experiences affect all human well-being, and examine differences based on gender, age, and other aspects.

In contemporary society, the concept of wealth adopted is not only manufactured assets, but also human capital, and the natural environment.
This paper only focus on human impact on the coastal environment of Japan, however, many areas of the world are without oceans. Instead it is encouraging that construct massive man-made lakes in areas of urban.
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necessary materials to research and write this thesis.
I also would like to express my appreciation to Prof. Hiroyuki SHIMADA, who was a supervisor in my master’s course and created an opportunity for me to study in the Graduate School of Maritime Science, Kobe University. He has always made time to answer my questions and give excellent guidance, and incent me to widen my research form various perspectives.

My sincere appreciation also goes to Assoc. Prof. John Matthew ROOKS, who always give me a lot of help and time in listening to me like my big brother, despite his busy schedules.

Many thanks are delivered to Assoc. Prof. Hirotada HASHIMOTO and all members of the Kobayashi Laboratory for supporting me in daily life. I am so thankful for the times that I am able to get together and enjoy lunch and coffee time with them every day.

I also owe a special debt of gratitude to all my relatives and friends who gave me a hand and helped me directly or indirectly during the difficult time I had living in Japan alone.

Lastly my thanks go to my beloved mother, Xiuming ZHANG, who has always helped me out of difficulties and supported me without a word of complaint through my seven years of studying in Japan. I still remember her tears on the day I left for Japan, the first time. It was my mother who gave me the confidence, and inspired me to study hard. Thanks for fostering me, and dedicating your life for me.
Appendix

Psychological effects questionnaire

アンケート用紙

あなたの家から海は見えますか [はい・いいえ]
一か月にどれくらい海を眺めることができますか [ほぼ毎日・約三日に一回・約週に一回・約二週間に一回・約一か月に一回・全く見られない] 海をどこで眺めますか [部屋・散歩・通勤や通学・旅行・海水浴・マリンスポーツ・釣り・その他]

<table>
<thead>
<tr>
<th>No.</th>
<th>アンケート項目</th>
<th>全く思わない</th>
<th>あまり思わない</th>
<th>どちらでもない</th>
<th>ややそう思う</th>
<th>強くそう思う</th>
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アンケート用紙

<table>
<thead>
<tr>
<th>質問項目</th>
<th>回答</th>
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<tbody>
<tr>
<td>年齢</td>
<td>()</td>
</tr>
<tr>
<td>性別</td>
<td>男・女</td>
</tr>
<tr>
<td>今年、海水浴に初めて来た時期</td>
<td>①7月1〜8日 ②7月9〜16日 ③7月17〜24日 ④7月25〜31日 ⑤その他（ 月 日頃）</td>
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<tr>
<td>今年、海水浴に最後に来た時期（予定）</td>
<td>①8月1〜8日 ②8月9〜16日 ③8月17〜24日 ④8月25〜31日 ⑤その他（ 月 日頃）</td>
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<tr>
<td>上記の期間での回数</td>
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<tr>
<td>どこから来たか（所要時間）</td>
<td>() 県/市/  約（ ）分</td>
</tr>
<tr>
<td>海水浴にかける費用（予定）</td>
<td>約（ ）円</td>
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<td>何人で来たか</td>
<td>()</td>
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<tr>
<td>あなたの海水浴ファン度合</td>
<td>①大好き ②好き ③ふつう ④それほどでもない ⑤嫌い</td>
</tr>
</tbody>
</table>

「次の項目をよく読んで、最近のあなたの気分について最もよく当てはまると思う番号をお答えください」

<table>
<thead>
<tr>
<th>番号</th>
<th>質問項目</th>
<th>回答</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>何かをする時にいつもより集中して…</td>
<td>①できた ②いつもと変わらなかった ③いつもよりできなかった ④全くなかった</td>
</tr>
<tr>
<td>2</td>
<td>①配事があって、よく眠れないようなことは…</td>
<td>①全くなかった ②あまりなかった ③あっ ④たびたびあった</td>
</tr>
<tr>
<td>3</td>
<td>いつもより自分のしていることに生きがいを感じることが…</td>
<td>①あった ②いつも変わらなかった ③なかった ④全くなかった</td>
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<tr>
<td>4</td>
<td>いつもより容易に物事を決めることができる…</td>
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<td>いつもストレスを感じたことが…</td>
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<td>6</td>
<td>問題を解決できなくて困ったことが…</td>
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<tr>
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<td>自信を失ったことがある…</td>
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アンケート用紙

<table>
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<th>質問項目</th>
<th>回答</th>
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<td>( 男・女 )</td>
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<td>①7月1～8日 ②7月9～16日 ③7月17～24日 ④7月25～31日 ⑤その他( 月 日頃 )</td>
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</tr>
<tr>
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<td>(   )回</td>
</tr>
<tr>
<td>どこから来たか(所要時間)</td>
<td>(   )県市  約(   )分</td>
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<td>約(   )円</td>
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<tr>
<td>何人で来たか</td>
<td>(   )人</td>
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<td>①大好き ②好き ③ふつう ④それほどでもない ⑤嫌い</td>
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「次の項目をよく読んで、今のあなたの状態に最もよく当てはまると思う番号に○印をつけてください。

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<th>当てはまる</th>
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</table>
アンケート用紙

このアンケートは今回の臨海学習についての意識を調査するものです。
次の 30 項目の質問にそれぞれ「とてもあてはまる」から「まったくあてはまらない」までの 5段階で自己にちょっともあてはまる数字にひとつ印をつけてください。
あまり深く考えず、アンケートに答えてください。

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<thead>
<tr>
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<th>質問項目</th>
<th>まったく</th>
<th>ちょっと</th>
<th>どちら</th>
<th>あまり</th>
<th>まったく</th>
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<td>4</td>
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</tr>
<tr>
<td>18</td>
<td>とても面白がってもまんできる</td>
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<tr>
<td>19</td>
<td>失敗しても、立ち直るのがはやい</td>
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<td>20</td>
<td>季節の変化を感じることができる</td>
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<tr>
<td>21</td>
<td>だれでも仲良くなる</td>
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<td>2</td>
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<tr>
<td>22</td>
<td>その場にふさわしい行動ができる</td>
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</tr>
<tr>
<td>23</td>
<td>だれでも、あいさつができる</td>
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<td>協力してカーボートをすめることができる</td>
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<td>25</td>
<td>聞きに、物事を考えられる</td>
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<td>自分に耐えられた仕事もしっかりとする</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27</td>
<td>かたを動かしても、疲れにくい</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>28</td>
<td>仕事やものむだ使いをしない</td>
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<td>2</td>
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<td>4</td>
<td>5</td>
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<tr>
<td>29</td>
<td>ナイフなどの刃物を、上手に使える</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30</td>
<td>洗濯機がなくても、手で洗うことができる</td>
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</table>
**p-value**

A *p*-value (shaded purple area) is the probability of an observed (or more extreme) result assuming that the null hypothesis is true.

The *p*-value is a function of the observed sample results (a statistic) that is used for testing a statistical hypothesis. More specifically, the *p*-value is defined as the probability of obtaining a result equal to or “more extreme” than what was actually observed, assuming that the null hypothesis is true. Here, “more extreme” is dependent on the way the hypothesis is tested. Before the test is performed, a threshold value is chosen, called the significance level of the test, traditionally 5% or 1% and denoted as $\alpha$.

If the *p*-value is less than or equal to the chosen significance level ($\alpha$), the test suggests that the observed data are inconsistent with the null hypothesis, so the null hypothesis must be rejected. However, that does not prove that the tested hypothesis is true.

(A1) https://en.wikipedia.org/wiki/P-value
The KJ-Method is fundamentally similar to the Snowball Technique. Introduced by the Japanese, it has become one of the “Seven management (New) tools” of modern Japanese quality management and uses values of Buddhism intended as structured meditation.

1. Card making: all relevant facts and information are written on individual cards. In a group-work version, the KJ-Method tends to place emphasis on the ideas being relevant, verifiable and important.

2. Grouping and naming: Cards that look as though they belong together should be grouped, ignoring any “oddities”. For each group write an apt title and place it on top of its group of cards. Repeat the group making, using new titles and any “oddities” to create higher-level groups.

3. Redistribution: The cards are collected in order than no one is given their own cards. One card is read out, and all contributors look through the cards in their own “hand” of cards, and find any that seem to go with the one read out, so building a “group”.

4. Chart making: Some of group may contain sub-groups, sub-sub-groups, arrange them carefully on a large sheet of paper in a spatial pattern that helps you to appreciate the overall picture.

5. Explanation: Try to express what the chart means to you, writing notes as you go and being careful to differentiate personal interpretations from the facts contained in the chart.

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