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Effects of the Coastal Environment on Well-being

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Abstract

In this study, we evaluated whether coastal zones influence well-being and we examined differences based on gender and age. We selected a residential housing area in Hyogo Prefecture as the survey site, and administered questionnaires 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 by the seaside showed higher positive psychological effects and had lower negative psychological effects. (2) 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. (3) The younger, middle-aged, and elderly groups living on 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. These results suggest that coastal zones positively affect individual well-being.

Keywords: Coastal environment; Well-being; Hyogo prefecture; Cultural services

Introduction

Human beings and the ecosystem are always interrelated and interdependent. Humans change the natural environment they are dependent on. At the same time, the natural environment is also transforming humans. The conception of "cultural services" are focused on providing a framework for understanding human benefits from nature environment. Viewing nature fosters positive moods and improves mental health [1,2]. Kawakubo et al. [3] 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 environments after a stress-inducing task leads to faster stress recovery than seeing urban environments [4]. Additionally, living in a natural environment is associated with fewer stress-related illnesses [5]. Evidence suggests that exposure to nature can have a range of psychological health benefits, including enhanced mood and mental wellbeing [6,7].

According to 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 [8]. In particular, environments with water – positively regarded as natural "blue spaces" – are associated with higher preferences, greater positive effects and higher perceived restorativeness [9]. Tajima et al. [10] studied the effects of living near a waterfront area were both positive and high on people's daily lives. 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.

Over a third of the world's population naturally chooses to live along a "narrow fringe of coastal land" [11]. An analysis of panel data from England that explored the positive effects of coastal zones on improving health and well-being of people [12] showed that individuals reported significantly better general health as well as mental health when living closer to the sea [13]. Coastal environments have recently received growing attention as people have come to appreciate ocean views. One experiment showed the qualitative and quantitative relaxing effects of living by the sea, which were confirmed by visits to the beach [14]. Living in a coastal zone is an ideal lifestyle sought by residents.

Japan as an island nation that benefits from the sea that surrounds it on all sides. There are many people who live near the coast. We planned to use the self-administered questionnaire to investigate the different psychological effects on residents who live by the sea versus those who do not in Hyogo Prefecture, Japan. To choose this theme because many people recognized that the coastal natural environment play an important role in well-being. We hypothesized that having an ocean view from one's home would have an impact on residents' feelings; that it would increase positive psychological effects, and lower negative psychological repercussions. We investigated one coastal zone and one non-coastal area to find out that coastal environment altered individuals' well-being. This allowed us to gain insight into the connections between residents with ocean views and those without, based on gender and age. Coastal environments exerted significant influence on both males and females. In addition, the younger, middle-aged, and elderly groups living on the coast experienced more positive effects than those living in non-coastal areas.

Methodology

Subjects

We selected two residential housing areas in Hyogo Prefecture, Japan, one with ocean views and one without, to see how coastal zones influence well-being. Hyogo Prefecture has coastlines on the Seto Inland Sea and the Sea of Japan. All the residents selected in this study were no significant differences in the economic status.

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We mailed questionnaire forms with a letter explaining the survey's purpose to randomly selected 4000 residents in both coastal and non-coastal areas. A total of 518 people answered the questionnaires, and returned the mailed questionnaires to us, for a collection rate of 12.95 percent. 518 questionnaires have well enough reliability and validity. Along with the questionnaire form, for ethical reasons we distributed a document describing the study's purpose, as well as a statement that participation was voluntary; this statement also mentioned privacy-related issues such as anonymity. We assumed that people who returned the completed questionnaire in the prepaid, stamped envelopes had consented to participate. We conducted the survey from September to October of 2014.

Questionnaire

In this study, the self-administered questionnaire included questions about socio-demographics (gender and age), whether respondents had ocean views from their homes, and a psychological effects inventory.

In general, the question items were similar to the ones that Suzuki et al. [15] used in earlier studies. Suzuki et al. used the self-administered questionnaire to study the psychological effects of water area, however, we focused on the effects of coastal area on human well-being, so we modified the question items to facilitate our investigation of the effects of ocean views. The KJ method [16] is a quantitative and qualitative tool of building up a problem-solving method through repetition. We objectively analyzed the similar question items to the same subscales. We used the KJ method 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). The names were selected for the five subscales (the passage of time, magnitude and awe, peace of mind, charm and longing, and threat) that clearly portrays the contents of the question items on our hypothesis. Four subscales of the questionnaire exert positive effects: the passage of time, magnitude and awe, peace of mind, and charm and longing. Threat leads to 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." We scored each subscale by calculating the mean of the item responses.

Statistical analysis

A total of 518 residents who returned the questionnaires filled all the necessary information, so we calculated 518 questionnaire data in this study.

In our statistical analysis, we calculated the mean values of the inventory scores between residents with and without ocean views. Then, we compared the inventory scores between residents (with or without ocean views) based on gender. Thirdly, we categorized all residents 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 between residents (with or without ocean views) based on three groups.

We entered and analyzed inventory data using the software Statistical Package for Social Sciences (SPSS, 2007). In order to summarize and interpret the descriptive data, we conducted a one-way Analysis of Variance (ANOVA) and Tukey's HSD post-hoc analysis for multiple comparisons. We set the statistical significance level at $p < 0.05$, $p < 0.01$.

Results

With/without ocean views

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

Regarding the contrast between coastal and non-coastal environments, the data in Table 1 show a significant difference ($p < 0.05$) for magnitude and awe, and strong significant differences ($p < 0.01$) for peace of mind, charm and longing, and threat. In terms of the passage of time ($p = 0.20$), there is no significant difference between the two areas.

Gender and 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 an ocean view.

In terms of the contrast between coastal and non-coastal environments based on gender, the data in Table 2 show a significant difference ($p < 0.05$) for passage of time, and strong significant differences ($p < 0.01$) for magnitude and awe, peace of mind, and charm and longing on males. In terms of males, the threat ($p = 0.62$) is not significant between coastal and non-coastal environments. The impact of females significantly affects ($p < 0.05$) peace of mind, and has highly significant effects ($p < 0.01$) on the magnitude and awe, charm and longing, and threat. The passage of time ($p = 0.87$) is not significant.

Age and 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 3 show a significant effect ($p < 0.05$) on passage of time for the younger group. The magnitude and awe ($p = 0.57$), peace of mind ($p = 0.50$), charm and longing ($p = 0.20$), and threat ($p = 0.14$) are not significant. In terms of the middle-aged group show a significant increase ($p < 0.05$) on passage of time, and strong significant increases ($p < 0.01$) for magnitude and awe, peace of mind, as well as charm and longing. There is no significant on the threat ($p = 0.53$). In terms of the elderly group show significant increases ($p < 0.05$) on peace of mind and threat, and a strong significant increase ($p < 0.01$) on charm and longing. There is no significant on the passage of time ($p = 0.82$), and magnitude and awe ($p = 0.22$).

Finally, in order to explore the relationship between the three age groups and the effects of coastal environments on well-being, we carried out a multiple comparison analysis, as shown in Table 4. The correlation between the younger and middle-aged groups is positive and significant ($p < 0.01$) for the passage of time, magnitude and awe, peace of mind, and charm and longing. The link between the younger and elderly groups is also strong significant ($p < 0.01$) 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.

Discussion

After adjusting for gender, age, and with/without ocean views,

Subscales	Coast and Non-coast	
	F	*p*
Passage of time	1.60	0.20
Magnitude and awe	6.00	*
Peace of mind	19.50	**
Charm and longing	48.22	**
Threat	8.79	**

(*p<0.05, **p<0.01)

Table 1: Predicting the psychological effects of residents with or without ocean views.

Subscales	Coast/Non-coast and Gender			
	Male		Female	
	F	*p*	F	*p*
Passage of time	5.08	*	0.02	0.87
Magnitude and awe	7.84	**	12.54	**
Peace of mind	20.88	**	4.16	*
Charm and longing	31.46	**	12.22	**
Threat	0.25	0.62	13.90	**

(*p<0.05, **p<0.01)

Table 2: Associations between gender and with or without ocean views.

Subscales	Coast and Non-coast and Age					
	Younger		Middle		Elderly	
	F	*p*	F	*p*	F	*p*
Passage of time	4.78	*	4.56	*	0.05	0.82
Magnitude and awe	0.33	0.57	7.89	**	1.51	0.22
Peace of mind	0.45	0.50	8.97	**	3.96	*
Charm and longing	1.63	0.20	25.01	**	16.59	**
Threat	2.27	0.14	0.39	0.53	5.31	*

(*p<0.05, **p<0.01)

Table 3: Associations between three age groups and with or without ocean views.

there is an apparent increase in individual wellbeing when living in proximity to Japan's coast. 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.

Coastal environments and psychological effects

In the results of this research (Figure 1), we can see the cause of a significant difference between coastal and non-coastal environments on the threat subscale. The coast may be important in 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 [17]. 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. Watanabe et al. [18] 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. 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. 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. We did not find any evidence of a beneficial effect of coastal proximity for the passage of time subscale.

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.

Associating coastal environments 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 revealed that women living near the sea had higher average scores than men for the four subscales (the passage of time, magnitude and awe, peace of mind, and charm and longing). On the other hand, they scored lower than men on threat.

Having an ocean view compared to those without an ocean views was significantly linked with positive impacts among males (Figure 2). Japanese men tend to have poor mental health and a higher level of work stress. It has been reported that men's poor mental health results from heavy occupational tension, and that lifecycles affect their mental health. Hence, men are a potential target population in the community for mental health support. We suggest that ocean views may be an instance of an important natural environment, which is a benefit for males to improve their mental health.

We observed significant differences in positive effects among females between those with ocean views and those without (Figure 3). Above all, women living in coastal zones had a high numerical value; when questioned about gazing at the sea, they described feeling peaceful. The numerical worth 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 had a higher range of error. Because Japanese women are busy to do housework, or take care of children every day, they could not look at time awareness, or feel that time is moving quickly or slowly.

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 than men to look at the sea; staying at home and away from the office seems to have a positive correlation with health. Moreover, there was a significant difference in score only among women for negative effect of threat. The impact of threat on women living with ocean views was lower than for men. Because Japanese men are not only the cornerstone of society, but also the primary source of family. They have much more harmful impact

Subscales	Coast and Non-coast and Age								
	Younger/Middle			Younger/Elderly			Middle/Elderly		
	M_1	SE_1	*p*	M_2	SE_2	*p*	M_3	SE_3	*p*
Passage of time	-0.54	0.11	**	-0.58	0.11	**	-0.05	0.10	0.90
Magnitude and awe	-0.38	0.10	**	-0.33	0.10	**	0.05	0.09	0.86
Peace of mind	-0.32	0.10	**	-0.37	0.10	**	-0.06	0.09	0.80
Charm and longing	-0.42	0.12	**	-0.52	0.12	**	-0.11	0.11	0.60
Threat	0.12	0.16	0.71	0.19	0.16		0.06	0.14	0.89

***p<0.05, **p<0.01, M_1 =M(younger)-M(middle), M_2=M(younger)- M(elderly), M_3=M(middle)-M(elderly)**

Table 4: Turkey's HSD post-hoc analysis for three age groups living on the coast.

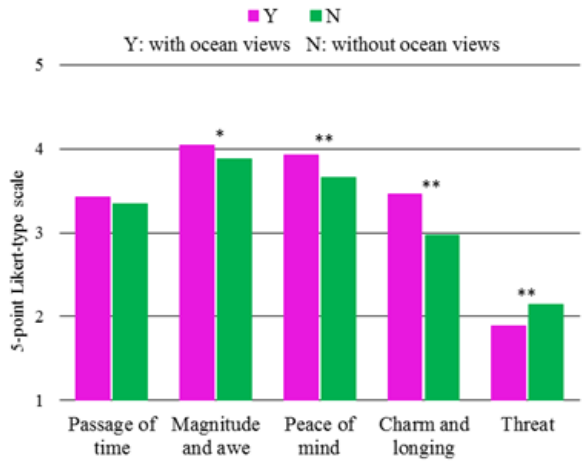

Figure 1: Mean scores for with/without ocean views (*p<0.05, **p<0.01).

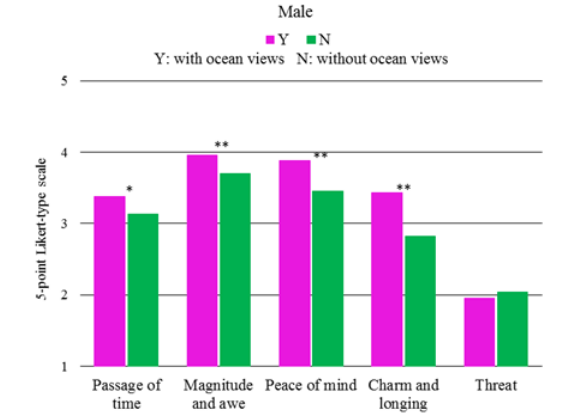

Figure 2: Mean scores for male and with/without ocean views (*p<0.05, **p<0.01).

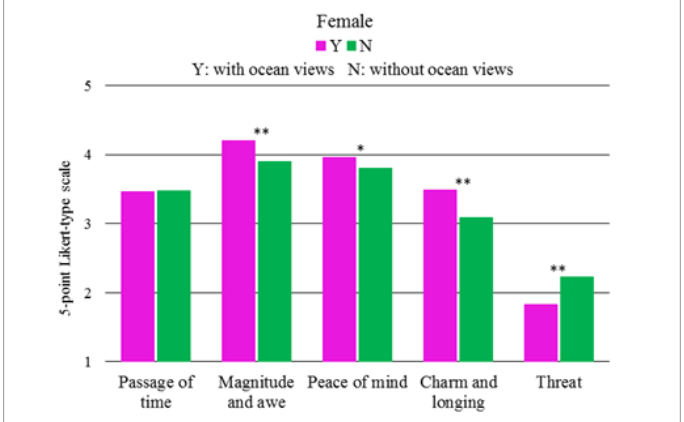

Figure 3: Mean scores for female and with/without ocean views (*p<0.05, **p<0.01).

than women. We presumed that the sea's freshness and openness influenced women more than men, and women were thus more able to resist the impact of negative feelings.

Associating coastal environments and age with psychological effects

We found that coastal effects were based on gender, but also on age. We could see the effect of age on coastal and non-coastal living, despite that we selected the participants from Hyogo Prefecture and that the sample size of the three age groups was not balanced.

We conducted each measure for the three age groups independently (Figures 4-6). 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 could in part 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 seemed to connect with age and gender. Individual well-being could be promoted by including more opportunities to view the sea. The impact of coastal environments on relieving stress and improving charm and longing were considered beneficial for well-being, more so than in non-coastal zones.

With respect to psychological effects, we observed a significant difference 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 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 had a strong sense of the effects resulting from ocean views in their day-to-day busy lives. Likewise, elderly people were much more likely to feel stronger psychological effects than those without. The elderly had 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 have little desire to appreciate the sea or go to the beach to play or relax. We assumed that all people would have a

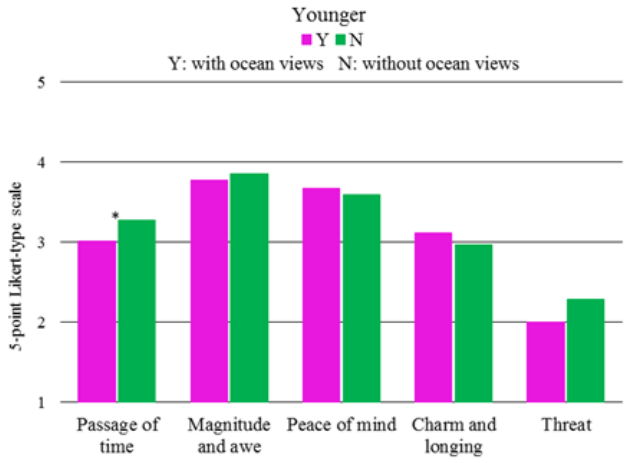

Figure 4: Mean scores for younger and with/without ocean views (*p<0.05, **p<0.01).

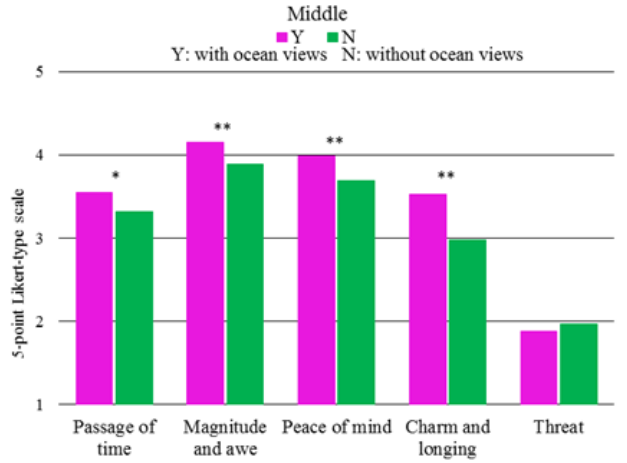

Figure 5: Mean scores for middle-aged and with/without ocean views (*p<0.05, **p<0.01).

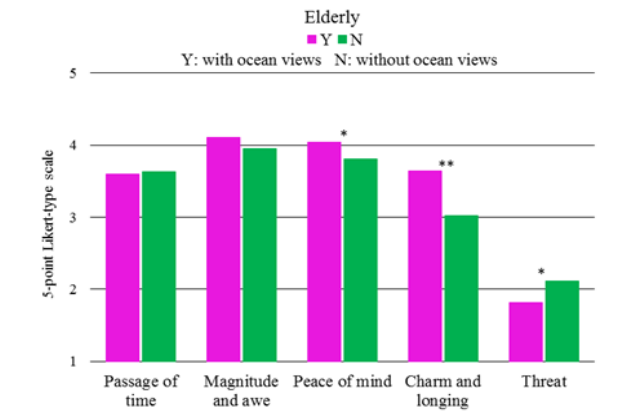

Figure 6: Mean scores for elderly and with/without ocean views (*p<0.05, **p<0.01).

positive opinion of the sea. For example, on the beach, there is no need to look at or worry about the time. However, young people always have their mobile phones with them, which take up lots of time. Nowadays, even though young people spend less time in nature, merely living near the sea offers long-term exposure to ocean views, which is greater than for individuals without them. In terms of the passage of time between with ocean views and without ocean views, the average scores of older people were higher than the younger people, therefore, ocean views benefit older people and arouse fond memories of the passage of time more than younger people.

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

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. We 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. [19], the frequency of reminiscence was shown to be higher among the elderly and middle-aged. We speculate that this is one reason why the elderly group scored high for the passage of time, since they enjoy opportunities to remember the past. Having time to remember an event may affect the frequency of the brain's ability to recollect. The elderly have a high 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 a 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 citizens. 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 images 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. 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 positive effects holds true.

Conclusion

We conducted a questionnaire (Table 5) survey 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 and age, we found an apparent beneficial effect from living in proximity to the coast. We obtained the following results.

Firstly, 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. In contrast, the negative psychological effect of threat is lower for coastal residents. Living by the ocean leads residents to feel positive emotions (such as calmness and peace) and promotes general well-being.

Questionnaire	
Subscales	**Question Items**
The Passage of time	You can forget how time flies.
	You can get tired of seeing the sea.
	You can feel getting a sense of season.
	You can forget everything easily.
	You can recall the old days.
Magnitude and Awe	You can feel magnitude and richness of nature.
	You can feel the mystery and wonder.
	You can feel the greatness and grandeur.
	You can feel the magical sense of natural beauty.
	You can feel a symbol of your own region.
	You can feel a sense of release and vastness.
Peace of Mind	You can cleanse yourself mentally.
	You can feel peaceful.
	You can feel pleasant.
	You can feel a sense of peace of mind.
	You can bring peace of mind.
	You can feel the freshness.
	You can feel the tranquillity.
Charm and Longing	You can get along with others easily.
	You can feel like a dream.
	You can feel elegance and luxury.
	You can feel like the place of relief.
	You can feel longing and hope.
Threat	You can feel intimidated.
	You can feel uncomfortable.
	You can feel upset.
	You can feel depressed.
	You can feel fear.

Table 5: Questionnaire survey.

Secondly, coastal environments had a greater positive influence on men than non-coastal zones. In addition, women living near the ocean had an increased likelihood of feeling more positive emotions in homes with ocean views, versus those without such views. Despite 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. On the other hand, the negative effects of ocean views on females were weaker than on males.

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

The natural environment is 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. In summary, the potential benefits of coastal environments positively affected people. We recognize that coastal zones may enhance positive emotions. However, several shortcomings limit this generalization. We did not assume all potentially relevant variables; therefore further study, in conjunction with more detailed potential benefits of living in coastal zones and the effects of overdevelopment, are needed. We would need a larger sample size to clarify and expand upon our study.

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

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