



Impacts of Beautiful Natural Surroundings on Happiness: Issues of Environmental Disruption, Food, Water Security and Lifestyle in Modern Times

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Purpose: Recently, purpose in life (PIL) drawn from existentialism and the concept of *ikigai* [meaning in his/her life] from Japanese classical literature have been recognized as effective ways to manage stress. PIL/*ikigai* is related to a function of the prefrontal lobe of the brain and influences happiness. However, many factors, including negative experiences, seem to inhibit development of PIL/*ikigai* and prefrontal lobe function. Using established evidence, the author discusses these issues in relation to increasing happiness.

Established Evidence: Genetic factors that affect prefrontal lobe function have not significantly changed since modern humans first emerged, but epigenetic changes caused by stress and chemicals influence gene expression. Development of the prefrontal lobe is influenced by sensory and motor experiences, the parent–infant relationship, stress, chemicals, and pollution. PIL/*ikigai* develops through positive experiences of playing and spending sufficient time in beautiful natural surroundings in cooperation with others and setting challenging goals and achieving them in conjunction with forming positive impressions. Historically, individuals who lived in natural surroundings, relied on cooperative relationships in their daily lives, and traveled on foot to obtain food. Humans today have the convenience of being able to obtain food in an urban setting. However, pollution, whether by disruption of the environment or pesticides, causes epigenetic changes that can lead to disease.

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Conclusion: Individuals should play more often and spend more time in beautiful natural surroundings in cooperation with others and set challenging goals and achieve them in conjunction with forming positive impressions. Environmental disruption and pesticide use should be minimized. In this way, increasing PIL/ikigai and fostering development of prefrontal lobe structure and function may increase overall levels of happiness.

Keywords: Beautiful natural surrounding; cooperative relationships; purpose in life/ikiga; prefrontal lobe function; environmental disruption; epigenetic function.

1. INTRODUCTION

Every person has the need to establish meaning in his/her life, which is a function of the prefrontal lobe of the brain. Related to this need is the concept of purpose in life (PIL), which is drawn from existentialism, and the concept of ikigai from Japanese classical literature [1]. PIL/ikigai emphasizes that every person should establish a meaning of life; everything changes; life is a one-time opportunity; and living here and now ambitiously is important [1]. PIL/ikigai is recognized as an effective way to manage stress as indicated by cognitions, emotions, autonomic nervous activity [1], and the endocrine system [2]. Happiness including quality of life is indicated by prolonged periods of positive cognitions and emotions that include high levels of satisfaction, pleasure, and comfort, and that are unaffected by negative cognitions and emotions such as depression, anxiety, and feelings of emptiness [3-5]. Thus, PIL/ikigai influences happiness. PIL/ikigai develops through positive experiences accompanied by positive impressions, such as spending time in beautiful natural surroundings, cooperative relationships, and setting challenging goals and achieving them in conjunction with forming positive impressions [1]. Recent focus has been on the effect of environmental disruption, food and water security, and excessively convenient lifestyle on brain structure and function related to happiness. Additionally recent research with integration of natural surroundings, body, and mind has been recognized as important because prefrontal lobe, which can control body and mind, had been evolved in natural surroundings since ancient days [1]. Therefore, using more detail and additional evidence, the author discusses these issues in relation to increasing happiness.

2. PREFRONTAL LOBE FUNCTION

Genetic factors that affect prefrontal lobe function have not significantly changed since modern humans first emerged [6,7]. Epigenetic changes influence gene expression of brain structure and function via DNA methylation and histone

acetylation [8-12]. The factors influencing epigenetic changes include sensory and motor experiences, parent–infant relationships [8,13], stress [14], chemical agents, and pollution [7-9,14]. Prefrontal lobe function in humans is more advanced than it is in other mammals due to evolutionary changes brought about by living in natural surroundings with plants and animals, and living in cooperation with other humans for tens of thousands of years [6,15,16]. Functions of the prefrontal lobe include integration of information from sensory organs, establishing personal goals, ambition, decision-making, and cooperation [15]. Successful adaptation to changing environments by prefrontal lobe function involves a balance between the sympathetic and parasympathetic nervous systems, and is facilitated by well-balanced secretion of neurotransmitters and hormones [1,2]. These functions of the prefrontal lobe allowed humans to prosper [8]. This evidence suggests that development of the prefrontal lobe structure and function may depend on positive experiences rather than negative experiences.

3. PREHISTORIC AND MODERN LIFESTYLES

Knowing the differences in lifestyle between prehistoric and modern humans may help individuals recognize the importance of spending time in natural surroundings, establishing cooperative relationships, and setting challenging goals and achieving them in conjunction with forming positive impressions [17-19]. Plants, fish, birds, animals, mountains, rivers, and seas have been around much longer than humans [8]. Historically, individuals lived in natural surroundings and relied on cooperative relationships in their daily lives; they traveled on foot to obtain food despite the many dangers that they could possibly encounter, including wild animals, violent storms, injury, and disease [17-19]. Successful hunting and gathering activities provided satisfaction and pleasure for the individuals involved [6,18]. Each individual in a given group engaged in these activities with handcrafted tools and was subjected to greater

hardships compared to modern-day humans [17-19]. This process may have contributed to humans developing their prefrontal lobe function [20] related to PIL/ikigai. This suggestion is supported by previous evidence that strong PIL/ikigai develops through positive experiences, including spending sufficient time in natural surroundings, having warm-hearted human relationships with others, and forming positive impressions from successfully fulfilling self-established goals [21]. In today's society, focus has been on mental stress caused by human relationships [22,23]. Humans have created many things for convenience and comfort, including roads covered by asphalt and concrete, televisions, air conditioners, cars, and reinforced-concrete buildings [17]. Humans can travel to stores by car to buy food and drinks. Furthermore, humans now have vocational specializations [17]. These processes may cause individuals to spend less time in natural surroundings, although cooperative relationships remain in society. Rapid economic growth can result in the destruction of natural environments due to desertification, acid rain, ozone depletion, and climate change [17,24,25]. Environmental disruption has polluted the earth [9,17,26]. Moreover, modern agriculture tends to utilize advanced fertilizers and pesticides, and

genetically modified crops and livestock [17]. All of these factors may negatively affect development of the structure and function of the prefrontal lobe and endocrine system. These negative factors sometimes cause epigenetic changes [10-12]. This suggestion is supported by previous evidence that weak PIL/ikigai in youth develops through negative experiences, including mental stress caused by excessive expectations from parents and teachers [27], persons who experience environmental degradation from mountaintop removal coal mining are at elevated risk for depression [28], adverse effects on the nervous system caused by air pollution [7], and abnormal steroid hormone levels caused by passive and active smoking [29]. Comparison of lifestyles between prehistoric days and modern times suggests that modern times provide more conveniences but fewer chances to develop prefrontal lobe function naturally and healthily for humans to achieve happiness.

4. TRENDS OF MEDICAL RESEARCH

Recent trends of medical research may help us achieve happiness. PubMed database in recent 10 years (2005 AD - 2014 AD) was used to identify the trends (Table 1) [30].

Table 1. Trends of published literatures for 10 years (2005 AD – 2014 AD) by PubMed database [30]

Field	Number of literatures		Regression analysis			
	Entry term	Total	Mean±SD	RG	SRG	P
Main title terms						
	"natural surroundings"	134	13.40±7.32	2.36	0.98	***
	"happiness"	8,353	835.30±573.80	187.29	0.99	***
Natural surroundings						
	"environmental disruption"	141	14.10±11.26	3.55	0.95	***
	"food and water security"	5,437	543.70±425.36	134.02	0.95	***
	"lifestyle"	88,446	8,844.60±5,874.89	1,923.13	0.99	***
	EFL [†]	93,458	9,345.80±6,265.57	2,049.32	0.99	***
Mind: Happiness						
	"purpose in life"	790	79.00±53.40	17.21	0.98	***
	"ikigai"	24	2.40±1.58	0.34	0.65	*
	"meaning in life"	616	61.60±47.76	15.32	0.97	***
	PIM ^{††}	1,245	124.50±87.38	28.52	0.99	***
Body: Brain and chemical response						
	"prefrontal lobe"	676	67.60±41.78	13.56	0.99	***
	"epigenetics"	17,874	1,787.40±1,547.10	498.79	0.98	***
	PE ^{†††}	18,564	1,856.40±1,589.87	513.24	0.98	***
Combination of terms						
	EFL AND PIM	282	28.20±21.98	7.04	0.97	***
	EFL AND PE	1,765	176.50±173.93	55.05	0.96	***
	PIM AND PE	10	1.00±1.05	0.27	0.77	*
	EFL AND PIM AND PE	5	0.50±0.71	0.10	0.44	.202

[†]EFL; ("environmental disruption" OR "food and water security" OR "lifestyle"), ^{††}PIM; ("purpose in life" OR ikigai OR "meaning in life"), and ^{†††}PE; ("prefrontal lobe" OR "epigenetics"), as created entry term, respectively. SD; standard deviation, RG; regression coefficient, SRG; standard regression coefficient. *; P<.05, **; P<.01, ***; P<.001

Entry terms were chosen by the author who considered their importance in the text and were categorized to 5 fields of "Main title terms," "Natural surroundings," "Mind: happiness," "Body: brain and chemical response," and "Combination of terms" (Table 1). Two fields name as "Natural surroundings" and "Mind: happiness," came from sub term of "Main title terms field." Symbols of "AND" or "OR," which was proposed by PubMed, indicate combination between each entry term (Table 1). Three entry terms "environmental disruption," "food and water security," and "lifestyle" in "Natural surroundings field" have common mean, then these terms were summarized in a new entry term as ("environmental disruption" OR "food and water security" OR "lifestyle") abbreviated by EFL. Three entry terms "purpose in life," "ikigai," and "meaning in life" in "Mind: happiness field" were also summarized in a new entry term as ("purpose in life" OR "ikigai" OR "meaning in life") abbreviated by PIM. Two entry terms "prefrontal lobe" and "epigenetics" in "Body: brain and chemical response field" also were summarized in a new entry term as ("prefrontal lobe" OR "epigenetics") abbreviated by PE. After identifying the PubMed database, total number and mean of the number of literatures were obtained for 10 years [30]. Trends of research were shown by regression coefficients of regression analysis, where independent variable was year and dependent one was the number of literatures for each year [31]. Level of significance for regression coefficient was stated at $P=.05$. Statistical analysis was performed by Sss® software (Esumi Co., Ltd.) [31]. Results showed that total number of literatures for "PIM AND PE," which indicates combination between "Mind field" and "Body field" seemed to be fewer than that of individual PIM and individual PE: total number of literatures for "EFL AND PIM AND PE", which indicates combination between "Natural surroundings field".

"Mind: happiness field," and "Body: brain and chemical response field," seemed to be fewer than that of individual "EFL AND PIM" and individual "EFL AND PE" (Table 1). Regression coefficient for each entry term significantly increased, while that for only "EFL AND PIM AND PE" did not significantly change (Table 1).

5. FUTURE RESEARCH

Evolutionary medicine, i.e., Darwinian medicine, proposes that disease is caused by evolution,

and effective treatment of the disease depends on recognizing the evolutionary process [8]. New neuronal networks can be developed by experiences during adulthood [13,15]. From ancient to modern times, humans have had the ability to adapt to changing environments [8]. This evidence suggests that PIL/ikigai is influenced by many factors. The factors include variations in and amount of experience, pollutants, chemicals in food and drinks, prefrontal lobe function, neurotransmitters, hormones, and epigenetic changes. Descartes (1596 AD- 1650 AD) originally proposed dualism, in which the mind and body are independent, while recent medical trends propose the importance of monism, in which the mind and body should be integrated [32]. The fewer number of literatures for combination between "Mind: happiness field" and "Body: brain and chemical response field," and combination between "Natural surroundings field," "Mind: happiness field," and "Body: brain and chemical response field" (Table 1) may require more researches based on monism. This process may help individuals achieve happiness.

6. CONCLUSIONS

In consideration of the evolutionary process, each individual should play more often and spend more time in beautiful natural surroundings in cooperation with others and set challenging goals and achieve them in conjunction with forming positive impressions. Pollution from environmental disruption should be prevented, and using pesticides should be avoided as much as possible. These ways of increasing PIL/ikigai and fostering development of prefrontal lobe structure and function may increase overall levels of happiness.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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