Association between healthy lifestyle practices and life purpose among a highly health-literate cohort: a cross-sectional study

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Abstract

Background

The national health promotion program in 21st century in Japan (HJ21) correlates life purpose with disease prevention; facilitating the adoption of healthy lifestyles. However, the influence of clustered healthy lifestyle practices on life purpose, in the context of a national health campaign, remains uninvestigated. Hence, this study assessed the association between such practices and life purpose in line with the HJ21.

Methods

A nationwide cross-sectional survey was given to certified specialists in health management. Participants' demographic information, lifestyle, and purpose in life using a validated tool were measured. The cohort was median-split into two groups based on their clustered health-related lifestyle score. Health-related lifestyle and purpose were compared between the two groups, and the correlation between health-related lifestyles and purpose in life was measured.

Results

Data from 4,820 participants were analyzed. The higher scoring health-related lifestyle group showed a significantly higher life purpose than the lower group (35.3 vs 31.4; $t = 23.6$, $p < 0.001$). The association between the scores of clustered healthy lifestyle practices and life purpose was significant ($r = 0.401$, $p < 0.001$). The better health-related lifestyle group achieved a higher life purpose than the lower group. This association between healthy lifestyle practices and life purpose denotes a positive and linear relationship.

Conclusions

The present study suggest that individuals who have a better health-related lifestyle gain a higher sense of life purpose. Healthy lifestyle predicted purpose in life. Examining causal relation between healthy lifestyle and purpose in life may provide more efficient approach for health promotion.

Introduction

Several studies have investigated the implications of life purpose and literature has shown that a strong sense of purpose in life was positively associated with positive health outcomes [1–6]. Thus, having a sense of purpose in life is a vital component of human life. Due to a rapidly aging society in Japan, a national health promotion program in the 21st century, namely Health Japan 21st century (HJ21), considered purpose in life as one of the major target goals of health promotion [7].

Purpose in life is defined as “a self-organizing life aim that stimulates goals”¹ and is known to promote healthy behaviors and giving meaning to life [8, 9]. *Ikigai* is a Japanese word that is considered an important factor for achieving better health and a fulfilling life [10]. *Ikigai* is defined as something to live for, exemplifying the joy and the goal of living [11]. Although *Ikigai* may not be fully comparable to purpose in life, it does contain the respective concept and plays a cardinal role in yielding positive health-related outcomes¹².

Notably, health outcomes associated with life purpose or *Ikigai* include physical [1, 12, 13] and mental health [3, 13], quality of life [4], disease mortality [1, 12], and longevity [12]. Possessing a strong sense of purpose in life was associated with a lower risk of mortality and cardiovascular diseases¹ (relative risk: 0.83 and 0.83, respectively). The study concluded that purpose in life tends to yield health benefits. One of the mechanisms speculated in the literature was the benefits associated with a healthy lifestyle. People who have adopted a higher purpose in life tend to live healthier lifestyles practices, which may decrease the incidence of non-communicable chronic diseases, such as cardiovascular diseases or cancer.

There is a hierarchy of causality among chronic diseases. Non-communicable diseases, such as diabetes, stroke, cancer, and coronary artery disease, have risk factors. In the case of risk factors, such as hypertension, smoking, dyslipidemia, hyperglycemia, studies typically signified proximal causes [14, 15]. A healthy lifestyle is a central causality for these risk factors and thus basic lifestyle should be considered a fundamental and proximal risk factor for the aforementioned non-communicable diseases. Studies also highlighted that healthy lifestyle practices prevent many similar chronic diseases [16, 17], and intervening to promote healthier lifestyle decrease mortality due to non-communicable diseases [18, 19]. Hence, the notion that health benefits are brought through a healthy lifestyle may be supported if the lifestyle strongly correlates with purpose in life.

In this context, however, research exploring the association of purpose in life with healthy lifestyle practices remain scarce. Besides, the existing literature usually considers a single health behavior in relation to purpose in life. To investigate the relationship between purpose in life and clustered health-related lifestyle, which is the fundamental and proximal cause of many health outcomes, the potential benefits of purpose in life towards disease prevention and health must be deciphered.

This study aimed to investigate the association between health-related lifestyles, in line with the HJ21, and purpose in life measured with a validated tool to better understand the relational mechanisms.

Method

Study design

The design was a cross-sectional study concerned with a cohort of nation-wide certified specialists in health management. We surveyed health-related lifestyles similar to the questionnaire used in the Japanese National Health Promotion in the 21st century. The survey included questions on demographic

data, health-related habits, including physical activity and exercise, nutrition and diet, smoking, stress, and alcohol intake. Purpose in life was measured with a validated tool in Japanese using the purposeful life scale [20] (Ikigai-9). The ethical committee of the Saitama Medical University approved the study (ID 896, 2018).

Study participants

Study participants were certified specialists in health management who actively pursued professional growth provided by the Japanese Association of Preventive Medicine for Adult Disease [21] (JAPA). We excluded specialists who did not continue to engage continuing education or health promotion activities. This certification is sponsored by the Ministry of Education, Culture, Sports, Science and Technology, Japan. These specialists are expected to engage the community and the society they live in to promote health and wellbeing. Specialists in health management are certified in multiple processes of study. Candidates study various aspects within the course, including health promotion, lifestyle-related diseases, mental health, nutrition, environment and health, physical activity and exercise, emergency medicine, life support, and health care system. To register, candidates sit for and pass the final written examination. The JAPA encourages specialists to participate in numerous activities by facilitating health promotion workshops, speeches, and activities after registration. Among these individuals who met entry criteria (n=9149), 4820 agreed to answer the survey.

Variables and measurements

Variables measured demographic characteristics and health-related habits, including physical activity and exercise, nutrition and diet, smoking, stress, and alcohol intake. There were eleven health-related lifestyle questions among which five were two-scaled ("Intention to maintain ideal weight", "Exercise", "Alcohol intake", "Manage lifestyle to prevent disease", "Smoking"). For these items, a score of "1" was assigned for an unhealthy lifestyle and a score of "4" was assigned for a healthy lifestyle. The rest of the six health-related habits ("Reading nutritional information labels," "Maintaining a balanced diet in daily life," "Intention for exercise," "Stress," "Rest," and "Sleep") were asked to be answered across 4 scales. Then, score of "4" (most favorable) to "1" (least favorable) were assigned for these variables. Finally, we added the values of each answer to the questions on the health-related lifestyle of the participants as the clustered health-related lifestyle scores. Ikigai-9 consists of nine questions on various aspects of life purpose and each question is marked across five scales from "1" (*Strongly disagree*) to "5" (*Strongly agree*). These variables and measurements were previously described elsewhere [22]. Age, weight, height, BMI, amount of alcohol intake, and purpose in life score were numeric. Sex, healthy lifestyle, smoking, alcohol intake, and stress comprised either binary or ordinal data.

Analysis

Descriptive statistics (i.e., mean, standard deviation, range) were used to describe participants' characteristics. The cohort was divided into two groups (i.e., a higher and lower group with a cut-off using the median score) based on the clustered health-related lifestyle scores. The difference in the Ikigai-9

score was investigated between the two clustered health-related lifestyle score groups. The association between the clustered health-related lifestyle score and the Ikigai-9 score was also analyzed as a bivariate correlation and a correlation coefficient was calculated to see whether the health-related lifestyles accounted for life purpose. Multiple regression analysis was performed to investigate the association between the clustered health-related lifestyle score and the purpose in life score after controlling for age. All statistical tests were two-tailed and the software IBM SPSS Statistics (Version 26.0. Armonk, NY) was used for the analysis.

Results

The demographic and health-related lifestyle characteristics of the study participants are shown in Table 1. In total, 4820 certified specialists in health management were included in the analysis. There were 3190 women (66.2%) and 1630 men (33.8%). The mean (*SD*) age of all study participants was 55.4 (12.2) years old. The majority of the participants (85.0%) were non-obese and “intended to keep ideal weight” and “maintain a healthy lifestyle (82.6% and 89.2%, respectively) to prevent lifestyle-related disease,” such as obesity, metabolic syndrome, and cardiovascular disease. We also found that more than 80% and 90% of the study participants “read nutritional information labels” and “maintained a balanced diet in daily life,” respectively. Regarding exercise and physical activity, more than 80% of the study participants “intended to exercise” and approximately 64% of them achieved the recommended levels. These findings reflected a low rate of obesity among the participants, which was 15.0% in the study. While most of the participants could rest and sleep adequately, the rate of taking on stress was high (74.4%).

Table 2 shows demographics and healthy lifestyle practices for both the higher and lower half of the clustered health-related lifestyle score group. We found favorable results in all measured health-related habits consistently in the higher half of the clustered health-related lifestyle score group. There was a significant difference in the scores of the purpose in life between the higher half and the lower half of the clustered health-related lifestyle score group ($t = 23.6, p < .0001$). In the higher half, the average score of purpose in life (Ikigai) was 35.3 (95% CI; [35.1-35.5]). In the lower half, the average score of purpose in life (Ikigai-9) was 31.4 (95% CI; [31.2-31.7]). Moreover, there was a significant association between the clustered health-related lifestyle score and purpose in life score, $r = .401, p < .001$. The significance was held after controlling for age.

Discussion

We found that the higher half of the clustered health-related lifestyle score group showed a statistically significant higher purpose in life than the lower half of the clustered health-related lifestyle score group. The study also highlighted a significant positive association between the clustered health-related lifestyle score and the Ikigai-9 score. To the best of our knowledge, this study was the first to show that a strong sense of purpose in life correlates with clustered health-related lifestyles in the context of a national health campaign. Several studies indicated a positive relationship between purpose in life and health-related lifestyles [1,23-25]. Also, many publications revealed a correlation between a single healthy habit

and purpose in life. Therefore, our findings, affirming a positive relationship between purpose in life and clustered health-related lifestyle, were consistent with previously reported results and help broaden the evidence of this association.

Exploring the mechanistic link of purpose in life with a healthy lifestyle may help us understand this relationship. While studies have highlighted the positive relationship between purpose in life and health-related lifestyle, a few studies' results are inconsistent with our findings. For example, a prospective study did not observe a positive association between purpose in life and healthy sleep patterns [26]. In other studies, the purpose of life was not associated with smoking [27,28]. Notably, the mechanistic link between health-related lifestyle and purpose in life was not well examined. Hooker et al. proposed a hypothesized model linking between purpose in life and health [29]. They summarized the relationship between life purpose and health outcomes utilizing the concept of self-regulation. In the model, they proposed that purpose influenced health through three self-regulatory processes and skills: stress-buffering, adaptive coping, and health behaviors. Health-related lifestyle, one of the self-regulatory processes, is the result of individuals setting goals, monitoring their progress, and using feedback to modify their lifestyle [29]. Thus, a purpose provides a foundation and motivation for engaging in a healthy lifestyle. Kim et al. also suggested that sense of purpose in life enhances the likelihood for engagement in restorative health-related lifestyle practices (e.g., physical activity, healthy sleep quality, use of preventive health care services) from cardiovascular disease to the indirect effect of behavior [30].

There is an alternative explanation for the mechanistic link between purpose in life and health-related lifestyle. A reverse causality model also suggested that engaging in healthy lifestyle practices could predict a greater purpose in life [29,31]. Our results denoted that the group with a higher score in purpose in life performed healthier lifestyle practices and behaviors (Table 2), which can be supported by either of the hypothesized models. However, further research is needed to clarify the mechanism and the directionality of the association. The mechanism to explain the causal relationship between life purpose and healthy lifestyle practices helped prepare for healthy aging by preventing diseases, increasing health longevity, and imbuing a health-oriented drive, which are the major goals of the HJ21.

Additionally, the difference in life purpose scores between the two groups (35.3 vs 31.4) shown in Table 2 should be further explored, whilst we found a statistically significant difference and a correlation between healthy lifestyle practices and purpose in life. Rather than being a single concept, purpose in life has several elements and a more comprehensive construct. The majority of measurement tools concerned with purpose in life assess two distinct concepts: the subjective presence of meaning (purpose) and subjective search for meaning (purpose) [32]. Ikigai-9 used in this study has three constructs in the measurement of purpose in life and seems to measure both concepts, but the total score does not distinguish between the association of specific constructs and healthy lifestyle practices. Thus, further methodological sophistication regarding the evaluation of a specific concept encompassed within life purpose needs to be studied. This aspect broadens our understanding of purpose in life and its relation to health. This particular cohort of certified specialists shared many features of high health literacy through the process of professional development and certification combined with life-long learning and activities

related to their role health management specialists. Health-related lifestyle practices that the certified specialists were far healthier than the national average. These characters entailed health literacy. Health literacy is considered to represent individuals' capacity to obtain and understand basic health information and services, and to make appropriate health-related decisions based on this information [33]. Therefore, health literacy is directly associated with disease mortality [34], overall health status [35], disease prevention [36,37], as well as health behaviors. These can be attributed to purpose in life [2].

Thus, both health literacy and health-related lifestyle appear to have a similar relationship with disease prevention and better health outcomes. The mediating effect of health literacy on the relationship between healthy lifestyle and life purpose should be investigated. Such inquiries in a prospective cohort study can better explain the mechanism of the causal link between purpose in life, health-related lifestyle, and health literacy.

Limitations

There are several limitations to the study. First, all the measurements were self-reported, which can be a source of bias. Second, the real-life meaning of purpose in life has not been determined yet. The Ikigai-9 score, one of the tools used to measure the life purpose score, is validated in a small and a limited population; however, the instrument may not capture it holistically. This limitation was implicated by the previously reported systematic review. Furthermore, Zheng et al. found variability in the strength of correlation among the questionnaire for quality of life, part of which included questions regarding a purposeful life [38]. Lastly, the correlational analysis did not include an adjustment for confounding factors other than age. Hence, little is known about factors influencing the relationship between a healthy lifestyle and purpose in life. We need to establish other potential influencing factors and determine which variables have mediating, moderating, and confounding effects on purpose in life to understand the causal relationship between healthy lifestyle practices and life purpose [39]. This exploration proposes a promising model for future intervention programs.

Strengths

Despite these limitations, this study has several strengths. First, the study sample size, $N = 4820$, was large and distributed throughout Japan. This aspect of the study increases generalizability. According to the previous review, numerous studies on purpose in life focused on older adults [40], whereas only a few were concerned with early or middle-aged adults. In the present study, the majority of the study participants were early and middle-aged adults. Second, previous studies used relatively simple questions or did not employ validated tools to measure purpose in life. However, we used a validated tool, Ikigai-9, in this study. This aspect allows the study results to increase the reliability and validity of the measurement of purpose in life and also hold applicability in other studies. Lastly, study participants were certified specialists in health management who have shown high health literacy. This inclusion criterion provides guidance on improving healthy lifestyle practices through health literacy as an approach to health promotion.

Conclusions

In conclusion, a healthy lifestyle was found to be positively associated with purpose in life among a cohort of highly health-literate professionals. However, the mechanism to explain the relationship between purpose in life and health-related lifestyle remains unknown. Therefore, causal relations between improving healthier lifestyles and increasing purpose in life should be tested.

Declarations

Ethics approval and consent to participate: This study complied with all the principles of the Declaration of Helsinki and obtained approval from the university ethics board. Informed consent was obtained from all individual participants included in this study. The ethical committee of the Saitama Medical University approved the study (ID: 896, 2018).

Consent for publication: All authors approved for publication.

Availability of data and material: The datasets used and/or during the current study are available from the corresponding author on reasonable request.

Competing interests: All authors declare that they have no conflict of interest, no financial interest, nor benefit from the direct application of this research. This research complied with all the principles of the Declaration of Helsinki and obtained approval from the university ethics board. Informed consent was obtained from all individual participants included in this study.

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Authors' contributions: All authors contributed to the study conception and design. Material preparation and data analysis were performed by Nobutaka Hirooka, Takeru Kusano, and Shunsuke Kinoshita. Nobutaka Hirooka, Shunsuke Kinoshita and Ryutaro Aoyagi collected the data. Nobutaka Hirooka, Takeru Kusano, and Hidetomo Nakamoto interpreted the analysis. The first draft of the manuscript was written by Nobutaka Hirooka and all authors commented on drafted versions of the manuscript. All authors read and approved the final version of the manuscript.

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Tables

Table 1 Demographic Characteristics of the Cohort

Characteristics	Total
Sex	
Male	1630
Female	3190
Age range	4820
< 30 years	129 (2.7)
30-39 years	372 (7.7)
40-49 years	930 (19.3)
50-59 years	1541 (32.0)
60-69 years	1291 (26.8)
70-79 years	489 (10.1)
≥80 years	68 (1.4)
Age (Ave years, <i>SD</i>)	55.4 (12.2)
Height (Ave cm, <i>SD</i>)	161.3 (8.0)
Weight (Ave kg, <i>SD</i>)	57.5 (10.8)
BMI (Ave kg/m ² , <i>SD</i>)	21.9 (3.3)
Obesity (%)	15.0
Intention to keep ideal weight (%)	
Yes	82.6
No	17.4
Managing Lifestyle for disease prevention (%)	
Yes	89.2
No	10.8
Reading nutritional information labels (%)	
Always	34.3
Often	47.9
Rarely	13.4
Very rarely	4.3
Maintaining a balanced diet in daily life (%)	
Always	52.8
Often	38.0
Rarely	8.0
Very rarely	1.2

Intention for exercise (%)	
Always	42.3
Sometimes	41.3
In the past	13.2
Never	3.1
Adequate Exercise (%)	
Yes	63.9
No	36.1
Excessive alcohol intake (%)	
	5.8
Smoking (%)	
Current	6.1
Past	18.0
None	75.8
Stress (%)	
High	20.4
Moderate	54
Low	21.8
None	3.7
Rest (%)	
Satisfactory	20.5
Adequate	54.0
Not adequate	21.8
Not satisfactory	3.7
Sleep (%)	
Satisfactory	21.3
Adequate	57.4
Not adequate	20.3
Not satisfactory	1.0

Table 2 Comparison between Health-related Lifestyle Groups: The Lower Half versus Higher Half

Characteristics	High	Low
Sex		
Male	882	748
Female	1701	1489
Age (Ave years, SD)	58.2 (12.0)	52.1 (11.5)
BMI (Ave kg/m ² , SD)	21.8 (3.0)	22.0 (3.7)
Obesity (%)	12.2	18.3
Intention to keep ideal weight (%)		
Yes	92.8	70.3
Managing Lifestyle for disease prevention (%)		
Yes	94.4	82.7
Reading nutritional information labels (%)		
Always	44.7	22.2
Often	45.4	50.8
Rarely	7.8	19.9
Very rarely	1.9	7.0
Maintaining a balanced diet in daily life (%)		
Always	68.3	34.9
Often	29.6	47.6
Rarely	2.0	14.9
Very rarely	0.1	2.5
Intention for exercise (%)		
Always	63.6	17.6
Sometimes	33.6	50.3
In the past	2.6	25.5
Never	0.2	6.5
Adequate Exercise (%)		
Yes	90.6	33.0
Excessive alcohol intake (%)	2.7	9.3
Smoking (%)		
Current	17.6	18.5
Past	1.2	11.6
None	81.0	69.1

Stress (%)		
High	10.8	31.6
Moderate	54.4	53.6
Low	28.6	13.9
None	6.3	0.8
Rest (%)		
Satisfactory	32.5	8.5
Adequate	55.1	53.0
Not adequate	11.8	32.0
Not satisfactory	0.5	6.5
Sleep (%)		
Satisfactory	32.1	8.8
Adequate	56.6	58.2
Not adequate	11.1	30.9
Not satisfactory	0.1	2.1
Purpose in life score ([95% CI])	35.3	31.4
	[35.1-35.5]	[31.2-31.7]