

Original

Personal lifestyle as a resource for work engagement

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Abstract: Objectives: Personal lifestyle, including diet, exercise, and sleep, might have an impact on work engagement, though previous studies have not focused on these relationships. The aim of this study was to examine whether dietary intake of fish, regular exercise, sufficient sleep, abstinence from alcohol, and abstinence from tobacco were positively associated with work engagement. **Methods:** We recruited adults aged 40-74 years who attended the health checkups with a particular focus on the metabolic syndrome in central Tokyo. In December 2015, 797 people responded to a questionnaire and 592 (74.3%) who had regular jobs were selected for this study. Work engagement was assessed on the 9-item Utrecht Work Engagement Scale (UWES-9). Bivariate and multivariate regression analyses were performed to examine the relationships between lifestyle and UWES-9. **Results:** Dietary intake of fish, regular exercise, sufficient sleep, and abstinence from tobacco were significantly correlated with the total UWES-9 score, even after adjusting for age, sex, and depressive and anxiety symptoms. The results suggested a dose-response relationship between dietary fish intake and work engagement. **Conclusions:** Dietary fish intake, regular exercise, sufficient sleep, and abstinence from tobacco might be lifestyle factors that can serve as resources for work engagement. These findings could be useful in motivating employees to make lifestyle improvements and convincing employers and managers that lifestyle is important not only for health but also for productivity.

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Introduction

The concept of work engagement is attracting growing interest. Work engagement is defined as “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption”¹. Some recent prospective studies have shown that work engagement is a predictor of better health, higher life satisfaction, and superior job performance², and that it lowers the risk of major depressive episodes³.

Resources for work engagement include the physical, psychological, social, and organizational aspects of the job⁴. Although several prospective studies revealed that work engagement was related with a decrease in ill-health⁵ and lower levels of high-sensitivity C-reactive protein⁶, most previous studies have focused on the psychological, social, and organizational aspects, but usually not on the physical aspects or lifestyle. For example, the New Brief Job Stress Questionnaires is intended to comprehensively measure job demands and task-level, workgroup-level, and organization-level job resources⁷, but does not measure physical aspects or personal lifestyle.

Yet, lifestyle-based approaches have become important in the prevention and treatment of mental disorders and the promotion of mental health⁸. Recent meta-analyses have indicated that exercise⁹ and consumption of eicosapentaenoic acid (EPA), a main component of fish oils¹⁰, are effective for depression. We previously reported a possible association between fish consumption and resilience¹¹, between exercise and resilience¹², and we found

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that resilience is a predictor of work engagement¹³). Also, insomnia is a well-known predictor of depression¹⁴, and it was suggested to be associated with lower work engagement¹⁵). Both alcohol use and tobacco use have well-established relationships with depression¹⁶). Given these findings, we hypothesized that personal lifestyle may be an important resource for work engagement.

The aim of this study was to examine whether dietary intake of fish, regular exercise, sufficient sleep, abstinence from alcohol, and abstinence from tobacco were positively associated with work engagement among workers who attended health checkups with a particular focus on metabolic syndrome, while adjusting for depressive and anxiety symptoms.

Subjects and Methods

Participants and Procedures

This cross-sectional study was conducted in accordance with the Declaration of Helsinki as revised in 2004 and the ethical principles laid out by the Ministry of Health, Labour and Welfare of Japan. It was approved by the Ethics Committees of the National Center of Neurology and Psychiatry, and of Tokyo Yamate Medical Center.

We recruited adults who attended the health checkups with a focus on the metabolic syndrome at a health screening center attached to a general hospital in central Tokyo, Japan, during the whole of December 2015. Health checkups and healthcare advice with a particular focus on the metabolic syndrome targeting people aged 40 or over have been conducted in Japan since 2008. Inclusion criteria were conversational Japanese ability for understanding the scope of the study and providing consent for study participation. Eligible people first completed a questionnaire for the health checkups, and then responded to another questionnaire for this study if they agreed to participate. Among the 978 people who attended the health checkups during the study period, 797 responded to the questionnaire (the response rate was 81.5%). Of the 797, 592 (74.3%) individuals possessing a regular job were selected as participants in this study.

Measures

The interview sheets for the health checkups with a particular focus on the metabolic syndrome included items on age, sex, alcohol and tobacco use, regular exercise, and sleep. Exercise and sleep were assessed with the following questions: “I usually walk or do equivalent physical activity for 1 hour or more per day, yes or no,” and “I get enough sleep and rest, yes or no.”

In addition to the interview sheets, we administered a questionnaire assessing fish consumption in daily life, the 9-item Utrecht Work Engagement Scale (UWES-9), and the Kessler 6 Scale (K6).

To measure fish consumption in daily life, we extracted

one item from the short version of the Food Frequency Questionnaire¹⁷): “How often do you usually eat fish or fish meals such as *sashimi* (raw fish) and/or *yakizakana* (grilled fish) ? Please consider the last 6 months.” Six response options were given for each question: almost never, 1-3 times per month, 1-2 times per week, 3-4 times per week, 5-6 times per week, and every day.

UWES-9 is a self-report questionnaire for measuring work engagement¹⁸). It consists of three subscales—vigor, dedication and absorption—each of which consists of three items rated on a 7-point Likert scale. The total score range from 0 to 54, with a maximum of 18 points on each subscale. The Japanese versions of UWES have been shown to be reliable and valid¹⁹).

K6 is a 6-item self-report questionnaire designed to screen for mood and anxiety disorders. Respondents rate their condition in the past 30 days²⁰). It yields a score ranging from 0 to 24. Validity and reliability of the Japanese version has been confirmed²¹).

Statistical Analysis

The means and standard deviations of the measures were calculated. We selected exercise, fish consumption, sleep, alcohol use, and tobacco use as independent variables to establish a model of work engagement and its subscales: vigor, dedication, and absorption. Multivariate regression analysis was used to examine whether the independent variables were associated with UWES-9 and its subscales, adjusted for age, sex, and K6. Because the number of participants who consumed fish 5-6 times per week or more was small, we converted dietary fish intake into a dummy that took a value of 0 for those who consumed fish 1-2 times per week or less, and 1 otherwise. In addition, we carried out bivariate regression analysis and Jonckheere trend test to examine the relationship between dietary fish intake and work engagement to test whether it is a dose-response relationship. We used the frequency of alcohol use (drinking almost every day) rather than the quantity of alcohol as an independent variable because many studies have shown a relationship between the frequency of alcohol use and depression¹⁶). For tobacco use, we divided it into two categories (current smoker versus non-smoker and past smoker), and used current smoker status as an independent variable. Also, we calculated Cronbach’s coefficient alpha for UWES-9 and K6. All data analyses were performed using the statistical software package SPSS, version 23.0J for Windows (IBM Japan, Tokyo).

Results

The characteristics of the participants are shown in Table 1. Of the 592 participants, 16 had missing data on dietary fish intake and 33 had missing data on K6. Table 2 and 3 show the results of the bivariate and multivariate re-

Table 1. Characteristics of participants (N=592)

Variables	n	%	Mean (range)	SD
Age			51.6 (39-83)	8.5
Sex, men	339	57.3		
Marriage status, married	384	64.9		
Smoking				
Non-smoker	259	43.8		
Current smoker	145	24.5		
Past smoker	188	31.8		
Alcohol				
None	88	14.9		
Occasional	164	27.7		
1-2 times per week	76	12.8		
3-4 times per week	70	11.8		
Almost every day (with liver holiday)	85	14.4		
Almost every day (without liver holiday)	109	18.4		
Fish consumption				
Almost never	25	4.2		
1-3 times per month	121	20.4		
1-2 times per week	273	46.1		
3-4 times per week	124	20.9		
5-6 times per week	23	3.9		
Every day	10	1.7		
Exercise: Daily exercise 1 hour or more, yes	264	44.6		
Sleep: Sufficient sleep, yes	324	54.7		
K6			3.3 (0-19)	3.7
Work engagement				
Total			40.4 (9-63)	12.8
Vigor			13.2 (3-21)	4.7
Dedication			14.5 (3-21)	4.4
Absorption			12.6 (3-21)	4.6

There were missing data on fish consumption for 16 participants, on stage of lifestyle change for 6 participants, and on K6 for 33 participants.

gression analyses. Dietary fish intake, regular exercise, sufficient sleep, and abstinence from tobacco were significantly positively associated with total UWES-9 score, even after adjusting for age, sex, and depressive and anxiety symptoms. In addition, age was positively associated with work engagement, whereas depressive and anxiety symptoms were negatively associated with it. Variance inflation factors were below 1.14.

For the subscales of work engagement, significant positive associations were found between dietary intake of fish and dedication and absorption; between regular exercise and vigor, dedication, and absorption; and between sufficient sleep and vigor. A significant negative association was found between tobacco use and absorption. R-squared of each model was significant.

The results of bivariate regression analysis between dietary fish intake and work engagement are shown in Ta-

ble 4. In terms of the beta values, higher fish intake seemed to be related to higher work engagement. A dose-response relationship was shown by Jonckheere trend test ($p < 0.001$).

Cronbach's alpha coefficients for UWES-9 and K6 were 0.945 and 0.863, respectively.

Discussion

This study is the first to suggest that aspects of personal lifestyle, such as dietary fish intake, regular exercise, sufficient sleep, and tobacco use, might be related to work engagement, even after adjusting for age, sex, and depressive and anxiety symptoms. A possible explanation of these results is positive spillover from life to work. Employees are usually encouraged to make lifestyle improvements to counter metabolic syndrome, not to en-

Table 2. Results of bivariate and multivariate regression analysis: Relationships between lifestyle factors and work engagement (n=592)

Variables	Bivariate			Multivariate		
	Beta	95%CI	P value	Beta	95% CI	P value
Dietary fish intake (3 times per week or more)	2.52	1.43, 3.61	<0.01	3.08	0.80, 5.37	<0.01
Exercise (1 hour or more per day)	4.39	2.29, 6.49	<0.01	3.16	1.14, 5.17	<0.01
Sleep (sufficient sleep, yes)	5.74	3.67, 7.82	<0.01	2.47	0.34, 4.59	0.02
Tobacco use (current smoker)	-3.62	-6.00, -1.23	<0.01	-2.42	-4.78, -0.06	0.04
Alcohol use (almost every day)	-0.24	-2.44, 1.97	0.83	-0.65	-2.85, 1.54	0.56
Age	0.41	0.29, 0.53	<0.01	0.29	0.17, 0.41	<0.01
Sex, women	-0.53	-2.67, 1.60	0.62	0.03	-2.06, 2.13	0.98
K6	-0.97	-1.24, -0.69	<0.01	-0.77	-1.05, -0.49	<0.01

R-squared for multivariate regression=0.18

Adjusted R-squared=0.17

CI, confidence interval

There were missing data on fish consumption for 16 participants and on K6 for 33 participants.

Multivariate regression used data of 546 participants.

Table 3. Results of multivariate regression analysis: Relationships between lifestyle factors and work engagement sub-scales (n=546)

Variable	UWES vigor	UWES dedication	UWES absorption
Dietary fish intake (3 times per week or more)	0.81 (-0.03, 1.66)	1.07 [#] (0.29, 1.85)	1.20* (0.36, 2.04)
Exercise (1 hour or more per day)	1.15 [#] (0.41, 1.90)	0.80* (0.11, 1.49)	1.20 [#] (0.46, 1.95)
Sleep (sufficient sleep, yes)	1.29 [#] (0.50, 2.07)	0.61 (-0.11, 1.34)	0.57 (-0.22, 1.35)
Tobacco use (current smoker)	-0.68 (-1.55, 0.19)	-0.56 (-1.37, 0.24)	-1.18 [#] (-2.05, -0.31)
Alcohol use (Almost every day)	0.06 (-0.75, 0.87)	-0.21 (-0.96, 0.54)	-0.51 (-1.31, 0.30)
Age	0.09 [#] (0.04, 0.13)	0.11 [#] (0.07, 0.15)	0.09 [#] (0.04, 0.13)
Sex, women	0.29 (-0.47, 1.06)	0.05 (-0.66, 0.77)	-0.32 (-1.08, 0.45)
K6	-0.34 [#] (-0.44, -0.23)	-0.27 [#] (-0.36, -0.17)	-0.17 [#] (-0.27, -0.07)
R-squared	0.19 [#]	0.17 [#]	0.13 [#]
Adjusted R-squared	0.18	0.16	0.12

*<0.05. [#]<0.01.

CI, confidence interval; UWES, Utrecht Work Engagement Scale

hance work engagement. Elucidating which lifestyle improvements are effective for both preventing disease and enhancing work engagement would be useful for health education.

A potential link between fish intake and positive psychological well-being has been documented. A previous study showed that taking omega-3 fatty acid supplements might contribute to preventing aggression²². Furthermore, dietary fish intake has been shown to be partially protective for depression in some epidemiological studies²³⁻²⁵. Omega-3 fatty acids have anti-inflammatory effect²⁶, inflammation has been suggested to be related not only with depression²⁷, but also with negative psychological well-being²⁸ and work engagement⁶. Thus, omega-3 fatty acids might be relevant to both prevention or attenuation of depression and enhancement of work engagement through anti-inflammatory effects.

Although some have argued that omega-3 fatty acid supplementation would be ineffective in countries such as Japan where fish consumption is already sufficiently high, we recently showed the potential efficacy of omega-3 fatty acids for depressive symptoms, even in Japan²⁹.

We previously showed the direct association between fish intake and resilience, and the indirect association between dietary fish intake and depression through resilience among company workers¹¹. On the other hand, many previous meta-analyses showed that EPA supplementation attenuated depressive symptoms among people with depression^{10,30}. Thus, dietary fish intake may independently associate with positive psychological well-being such as resilience and work engagement in healthy people, and omega-3 fatty acids supplementation may independently decrease depressive symptoms in depressive patients.

Table 4. Results of bivariate regression analysis: Relationship between dietary fish intake and work engagement (n=576)

Dietary fish intake	beta	95% CI	P value
Almost none (n=25)	Reference		
1-3 times per month (n=121)	-1.17	-6.65, 4.32	0.68
1-2 times per week (n=273)	2.24	-2.98, 7.45	0.40
3-4 times per week (n=124)	5.09	-0.38, 10.6	0.07
5-6 times per week (n=23)	7.75	0.54, 15.0	0.04
Every day (n=10)	8.78	-0.56, 18.1	0.07

CI, confidence interval

Exercise has well-known benefits for physical and mental health, and a previous study showed that more time spent on moderate physical activity during leisure time provided a buffer against increasing negative spillover and declining health³¹). In addition to its biological effects, exercise sometimes involves instructors or friends, which may improve social relationships. Indeed, improvements in mental health after exercise have been shown to be related, at least in part, to the social relationships provided by exercise with others³²). This change in interpersonal relationships might influence relationships in the workplace. It should be noted that some studies have found a U-shaped association between exercise and depressive symptoms³³⁻³⁵). Because this study did not examine the dose-response relationship between exercise and work engagement, further studies should examine this issue.

Insufficient sleep can cause daytime dysfunction, so it is not surprising that sufficient sleep was positively associated with the total work engagement score and the vigor subscale. However, we must bear in mind that job demands and job resources were not assessed fully in this study. For example, work overload can prolong working time, leading to reduced sleeping hours. The effect of sufficient sleep on work engagement might become marginal when certain types of job demands and job resources are included in the regression model. Furthermore, it would be worthwhile to examine sleep in greater detail, including sleep quality, latency, duration, efficiency, and disturbance in the future.

Tobacco use was negatively associated with total work engagement score and the absorption subscale, which is characterized by being fully concentrated in one's work⁴). A previous study showed a negative association between tobacco use and work engagement, although it did not reach the level of statistical significance³⁶). Smoking is prohibited on the premises of many companies in Japan, so their employees must leave the premises to smoke. This context in Japan may explain our results regarding tobacco use, in addition to the possible correlation of tobacco use with physical and mental dysfunction.

This study has several limitations. We recruited adults

aged 40 to 74 years who attended the health checkups with a particular focus on the metabolic syndrome at one health screening center in central Tokyo. Consequently, this study does not have any data on people in their 20s and 30s, and our results might not be applicable to other countries or other parts of Japan. Importantly, we did not fully assess job demands and job resources. The regression coefficients in this study were marginally significant, suggesting that there are many other factors that are more deeply related to work engagement. Details of jobs such as company size, industrial category, and work duties could also affect the results. Additionally, the model did not include some other potential confounders such as educational attainment and history of illness. Selection bias might also affect the results. Further studies of other populations are necessary. Furthermore, this cross-sectional design could not reveal causality, nor rule out causality. Adequate fish intake, exercise, and sufficient sleep might be consequences of work engagement.

To conclude, some aspects of personal lifestyle, including dietary fish intake, regular exercise, sufficient sleep, and abstinence from tobacco might have positive impacts on work engagement. These findings could be useful in motivating employees to make lifestyle improvements and in convincing employers and managers that employee lifestyle is important not only for health but also for productivity.

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Statement of human rights: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the Helsinki declaration and its later amendments or comparable ethical standards.

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