Health Consciousness of Young People in Relation to their Personality

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Personality of targeted individuals can be assumed to influence behavior modification by health education. In this study the influence of personality on health consciousness was analyzed by a questionnaire for lifestyle, health consciousness, and the NEO-FFI personality test. Subjects were 942 new students in the Tokyo University of Agriculture who were surveyed in April, 1998. Separately performed health examination data were used to verify reliability of answers to the questionnaire. Among students, 83.2% of males and 90.4% of females felt themselves to be healthy, and more than 80% students desired to improve their health more. The rate of having no physical complaints, however, was only 31.7% in males and 20.4% in females.

Distribution of NEO-FFI scores of neuroticism (N), extraversion (E), openness (O), agreeableness (A), and conscientiousness (C) corresponded well between males and females, except for significantly higher scores of O and A in females.

Odds ratios (ORs) between high and low tertial points of NEO-FFI score for health consciousness were significantly elevated in the high scoring groups of E and C (OR=6.26, 95%CI=1.46-26.82, and OR=6.04, 95%CI=1.42-25.71, respectively) in males. On the contrary, high N and O groups had low health consciousness. Smoking habit was associated with high E scores (OR=2.24, 95%CI=1.13-4.43). Dietary habits, regular eating time, and avoidance of salty foods were associated with high C scores in both males and females. The OR of regular eating time was 2.66 (95%CI=1.42-1.98), and 2.20 (95%CI=1.31-3.71) for males and females, respectively. The OR of avoidance of salty foods were 2.09 (95%CI=1.11-3.91), 1.87 (95%CI=1.11-3.16) for males and females, respectively. Significant associations between lifestyle and personality require further study for risk association analysis and for relationship to interventive practices for prevention of lifestyle associated diseases.

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A well-balanced lifestyle of proper nutrition, exercise, and rest is shown to be effective for prevention of disease and promotion of good health ¹. Prevention of future chronic diseases must start by development of healthy lifestyle habits during adolescence, as a majority of chronic diseases require about 20 to 30 years for full development ². Personality is known to influence behavior modification that results from health education. The NEO Five-Factor Inventory (NEO-FFI) questionnaire which is based on five factors (neuroticism, extraversion, openness, agreeableness, and conscientiousness), can provide

insights into the important dimension of individual differences in personality. The Japanese version of the NEO-FFI is shown to have good reliability and validity by Yoshimura et al ³.

Whether or not personality influences the lifestyle habits and health consciousness is a question that needs investigation. New students entering university, who are required to undergo a health examination, were surveyed for health consciousness levels, lifestyle, and personality utilizing the questionnaire for "Health Promotion and Personality". Relationships between personality determined by the NEO-FFI score and lifestyle,

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health consciousness, and health promoting activity, were analyzed to clarify the influence of personality on health issues.

SUBJECTS & METHODS

New students entering the Tokyo University of Agriculture in 1998 were surveyed using the questionnaire for "Health Promotion and Personality". New students in three faculties of the university participated in the study. The total number of subjects were 942, of which 504 were from the Faculty of Agriculture, 255 from the Faculty of International Agriculture and Food Studies, and 183 from the Faculty of Applied Bioscience. The questionnaire was distributed in the classroom and collected during a week of orientation for new students in April, 1998. The questionnaire included 14 questions about lifestyle and health consciousness, and NEO Five-Factor Inventory (NEO-FFI) questionnaire for personality (Table 1-1, 1-2). NEO-FFI was developed as a comprehensive scale of the five domains of personality: N-neuroticism, E-extraversion, A-agreeableness, O-openness, and C-conscientiousness. The NEO-FFI is a shortened version of revised NEO Personality

Inventory (NEO-PI-R)⁴, consisting of five 12-item scales that measure each of the domain. Subjects indicated how much they agreed with each item by marking a 5-point scale, e.g. strongly disagree, disagree, neutral, agree, and strongly agree, in Likert response format. Age, height and body weight were also obtained by the questionnaire. Characteristics of the high score group and the low score group by NEO-FFI factors are summarized in Table 1-3.

The questionnaire employed a mark sheet method in which marks filled by subjects were computer processed directly through an optical scanning device (Optical Mark Reader SR 900 Series Sekonic Ltd., Tokyo).

The database produced by the optical mark reader was transferred to SPSS Ver. 8.0 J, and processed for statistical analysis. Score of N, E, O, A, and C in each student group was compared and tested by Student t-test. For calculation of odds ratio between the high score group vs. low score group, data were classified at tertiary points into 3 groups. Odds ratios were obtained by 2×2 tables, and 95% confidence intervals by χ^2 test.

Table 1-1. Questionnaire for health promotion and personality.
Questions about lifestyle and health consciousness.

Category	Question
Physical characteristics	Height, Body Weight
Lifestyle	Smoking
	Alcohol
	Sleeping hours
	Living status
Health consciousness	Current health status
	Desire for health
	Desire for information about health promotion
Complaints	Subjective symptoms
	Rest
Practice	Exercise
	Practice to promote health
Dietary habit	Dietary habit
	Daily intake of foods

Table 1-2. Sample NEO-FFI items.

Scales	Sample
Neuroticism	I often feel inferior to others. I am seldom sad or depressed.
Extraversion	I like to be where the action is. I am cheerful, high-spirited person.
Openness	Once I find the right way to do something, I stick to it. (R) I have a lot of intellectual curiosity.
Agreeableness	I try to be courteous to everyone I meet. I generally try to be thoughtful and considerate.
Conscientiousness	Some people think I'm selfish and egotistical. I strive for excellence in everything I do. (R)

(R): indicates that item is reverse-scored

Table 1-3. Brief explanation of personality by NEO-FFI factors.

	Characteristics of the high scorer	Characteristics of the low scorer
Neuroticism	Worrying, nervous, emotional, insecure, inadequate, hypochondriacal	Calm, relaxed, unemotional, hardy, secure, self-satisfied
Extraversion	Sociable, active, talkative, person-oriented, optimistic, funloving, affectionate	Reserved, sober, unexuberant, aloof, task-oriented, retiring, quiet
Openness	Curious, broad interests, creative, original, imaginative, untraditional	Conventional, down-to-earth, narrow interests, unartistic, unanalytical
Agreeableness	Soft-hearted, good-natured, trusting, helpful, forgiving, gullible, straightforward	Cynical, rude, suspicious, uncooperative, vengeful, ruthless, irritable, manipulative
Conscientiousness	Organized, reliable, hard-working, self-disciplined, punctual, scrupulous, neat, ambitious, persevering	Aimless, unreliable, lazy, careless, lax, negligent, weak-willed, hedonistic

RESULT

Response rate: The questionnaires were collected from 713 of the 942 registered new students (response rate = 75.7%). Response rates for each faculty is listed in Table 2. Average age and S.D. of 356 male and 357 female students was 18.9 yr. $\pm$ 1.7 and 18.6 yr. $\pm$ 1.5, respectively. Self-reported height, body weight, and body mass index (BMI) are shown in Table 3. These values were corresponded well with those obtained by the health examination performed in April, 1998. Pearson's correlation coefficients between the questionnaire and health examination values for height for all subjects, males, and females were 0.993, 0.982, and 0.988, respectively ($p < 0.000$). For body weight, the Pearson's correlation coefficients were 0.985, 0.984, and 0.970, respectively ($p < 0.000$). Physical characteristics and lifestyle of participants are summarized in Table 3. Current smoking rate was 25% in males and 1.4% in

females. The rates of ex-smokers in males and females were 6.2% and 3.1%, respectively. No alcohol drinking habit was recognized in one-third of males and two-third of females. A scant percentage of students in both sexes assumed to be regular drinkers.

Regarding living status, about half of the subjects lived with their family; 48.3% of male students and 37.8% of female students lived alone in an apartment; with the remainder living in dormitories. Sleeping hours was mostly 6-7 hours in both sexes. Health consciousness of subjects is shown in Table 4-1. Most students viewed themselves to be healthy, but 16.8% of males and 9.5% of females assessed themselves as less healthy or not healthy. As for desire to be healthy, hoping for better health was expressed by 47.2% and 42.6% for the males and females respectively, and the desire to maintain current health was felt by 36.5% and 44.0% of the males and females, respectively. In males 16% and in females 13.4% showed on particular atten-

Table 2. Number of participants.

Faculty	Department	New Students	Subjects		Response Rate (%)
		Total	Total	(Male, Female)	
Agriculture	Agriculture	279	208	(127, 81)	74.6
	Zootechnical Science	225	163	(82, 81)	72.4
International Agriculture and Food Studies	Bio-Business Management and Information	195	131	(92, 39)	67.2
	Bio-Business Management and Information(night course)	60	40	(21, 57)	66.7
Applied Bioscience (Nutrition Science)	Major in Food and Nutrition	88	78	(26, 14)	88.6
	Major in Administrative Nutrition	95	93	(8, 85)	97.9
Total		942	713	(356, 357)	75.7

Table 3. Physical characteristics of participants and lifestyle.

		Male n=356	Female n=357
Physical characteristics	Age	18.9 ± 1.7 ¹⁾	18.6 ± 1.5
	Height (cm)	171.5 ± 5.9	158.3 ± 5.4
	Body weight (kg)	64.1 ± 11.1	51.6 ± 7.3
	BMI	21.7 ± 3.2	20.6 ± 2.5
Smoking	Current Smoker	89 (25.0%) ²⁾	5 (1.4%)
	Ex-smoker	22 (6.2%)	11 (3.1%)
	Nonsmoker	245 (64.8%)	341 (95.5%)
Alcohol	No Drinking	135 (37.9%)	222 (62.2%)
	1-3 time/month	156 (43.8%)	115 (32.2%)
	1-2 time/week	53 (14.9%)	15 (4.2%)
	3-4 time/week	8 (2.2%)	4 (2.2%)
	Almost always	4 (1.1%)	1 (0.3%)
Living status	With family	156 (43.8%)	179 (50.1%)
	Alone	172 (48.3%)	135 (37.8%)
	Other	28 (7.9%)	43 (12.0%)
Sleeping hours	≤ 5hr	31 (8.7%)	41 (11.5%)
	6hr	150 (42.1%)	166 (46.5%)
	7hr	132 (37.1%)	112 (31.4%)
	8hr	35 (9.8%)	35 (9.8%)
	≥ 9hr	8 (2.2%)	3 (0.8%)

1) Mean±SD

2) Number (%)

tion to health. Exercise, diet and management of stress were health promoting subjects about which many students expressed a desire for information. Information about resting, alcohol cessation, moderation of alcohol drinking, and weight control were also desired. Interest in body weight dietary control was shown by about two-thirds of the female students. In the category of self-assessed health complaints, fatigue and eye-strain (35.5% and 30.7%, respectively), were common (Table 4-2). Stiff shoulder was a complaint in 40.1% of female students. Diarrhea, constipation and feeling depressed were complaints of 10-20% of students. The proportion with no complaints was only 31.7% in males and 20.4% in females. As for the rest, while most students felt that they were getting sufficient or moderately sufficient rest, about 20% of students felt their sleep was insufficient or deficient. Among students, 55.3% males and 82.1% females did not exercise, although one third of them considered that exercise promotes health. More than half of the female students considered that diet and nutrition were important to promote health. Most female students ate breakfast (88.5%) and kept regular eating schedules (48.7%) than male students (Table 4-3). On the contrary, while snack eating was prevalent in both sexes, female students ate more snacks than males (79.3% vs. 65.7%). Avoidance gorging when eating and avoiding salty foods were practiced by about half of the students. Half of the male students consumed meat daily. More females than males ate fish, egg, legume, green-yellow vegetables, and seaweed.

NEO-FFI score is shown in Table 5 and Fig. 1. Scores for both males and females coincided well, but female students

showed significantly higher score for Openness and Agreeableness. Intercorrelation coefficients among NEO-FFI scales are shown in Table 6. Weak significant associations were present between E and A (0.16), E and C (0.27), A and C (0.24), N and E (-0.24), N and A (-0.31), and N and C (-0.27).

Odds ratios between personality factors and health consciousness, lifestyle, dietary habits, and health promoting practices are shown in Table 7. Each personality factor showed significant associations with health status and consciousness, as follows:

Neuroticism: High scorers in males considered themselves "not healthy" (healthy/not healthy OR=0.32, 95%CI=0.15-0.70), showed high smoking prevalence (smoker/non smoker OR=0.43, 95%CI=0.23-0.81), and had a high consumption of snacks between meals (OR=1.82, 95%CI=1.05-3.17). The high score group also had more self complaints, and felt deficiency in rest than those in the low score group.

Extraversion: The high score group students for both males and females felt themselves to be healthy (OR=6.26, 95%CI=1.46-26.82 in males, OR=5.24, 95%CI=1.22-22.60 in females), and showed a odds ratio for self complaints (OR=0.59, 95%CI=0.31-1.13 in males, OR=0.44, 95%CI=0.24-0.82 in females). They also exercised more (OR=3.38, 95%CI=1.76-6.49 in males, OR=2.12, 95%CI=1.11-4.06 in females). The high score male group also showed higher rate of smoking and more daily intake of meat and legumes compared to the low score group.

Openness: High scoring male students had less smoking (smoker/non smoker OR=0.48, 95%CI=0.26-0.90), less sleep-

Table 4-1. Health consciousness.

	Male		Female		Total	
	n	%	n	%	n	%
Health consciousness						
Health Status						
Very healthy	58	16.3	74	20.7	132	18.5
Healthy	238	66.9	249	69.7	487	68.3
Less healthy	52	14.6	34	9.5	86	12.1
Not healthy	8	2.2	0	0.0	8	1.1
Desire for health						
Hope for better health	168	47.2	152	42.6	320	44.9
Maintain health	130	36.5	157	44.0 *	287	40.3
Not consider	57	16.0	48	13.4	105	14.7
Indifference	1	0.3	0	0.0	1	0.1
Desire for information about health promotion						
Exercise	158	44.4	201	56.3	359	50.4
Diet	157	44.1	221	61.9 *	378	53.0
Rest	93	26.1	98	27.5	191	26.8
Alcohol	62	17.4	43	12.0	105	14.7
Smoking	21	5.9	2	0.6	23	3.2
Dissolution of stress	112	31.5	113	31.7	225	31.6
Loose body weight	85	23.9	229	64.1 *	314	44.0
Blood pressure	13	3.7	11	3.1	24	3.4
Other	5	0.7	7	1.0	12	1.7
None	62	17.4	24	6.7	86	12.1

*Significantly different between gender (p<0.05)

Table 4-2. Self symptoms and rest.

	Male		Female		Total	
	n	%	n	%	n	%
Self symptoms						
Health complaints						
Sleepless	38	10.7	31	8.7	69	9.7
Fatigue	119	33.4	134	37.5	253	35.5
Headache	36	10.1	41	11.5	77	10.8
Stiff shoulder	74	20.8	143	40.1 *	217	30.4
Eye-strain	96	27.0	123	34.5 *	219	30.7
Loss of appetite	27	7.6	6	1.7	33	4.6
Diarrhea & Constipation	44	12.4	79	22.1 *	123	17.3
Pulsation	7	2.0	7	2.0	14	2.0
Depression	43	12.1	42	11.8	85	11.9
Impatience	23	6.5	30	8.4	53	7.4
None	113	31.7 *	73	20.4	186	26.1
Rest						
Sufficient	78	21.9	84	23.5	162	22.7
Moderate	198	55.6	194	54.3	392	55.0
Insufficient	64	18.0	67	18.8	131	18.4
Deficient	16	4.5	12	3.4	28	3.9

*Significantly different between gender (p<0.05)

Table 4-3. Practice and dietary habits.

	Male		Female		Total	
	n	%	n	%	n	%
Practice						
Exercise						
≥ 3 time/week	41	11.5 *	20	5.6	61	8.6
1-2 time/week	118	33.1 *	44	12.3	162	22.7
No Exercise	197	55.3	293	82.1 *	490	68.7
Practice to promote health						
Exercise	120	33.7	117	32.8	237	33.2
Diet and Nutrition	117	32.9	183	51.3 *	300	42.1
Rest	60	16.9	66	18.5	126	17.7
Alcohol	2	0.6	3	0.8	5	0.7
Exsmoking	15	4.2	5	1.4	20	2.8
Dissolution of stress	36	10.1	29	8.1	65	9.1
Measure of body weight	52	14.6	108	30.3 *	160	22.4
Measure of blood pressure	0	0.0	3	0.8	3	0.4
None	120	33.7 *	79	22.1	199	27.9
Other	5	1.4	8	2.2	13	1.8
Dietary habit						
Daily take of breakfast						
Yes	216	60.7	316	88.5 *	532	74.6
None	140	39.3 *	41	11.5	181	25.4
Eating time						
Regular	119	33.4	174	48.7 *	293	41.1
Irregular	237	66.6 *	183	51.3	420	58.9
Snack between meals						
Not take	122	34.3 *	72	20.2	194	27.2
Take	234	65.7	283	79.3 *	517	72.5
Eating volume						
To full	177	49.7	194	54.3	371	52.0
Moderate	179	50.3	161	45.1	340	47.7
Avoidance of salty foods						
Yes	152	42.7	170	47.6	322	45.2
No	202	56.7	181	50.7	383	53.7
Daily intake of;						
Meat	178	50.0 *	126	35.3	304	42.6
Fish	30	8.4	61	17.1 *	91	12.8
Egg	108	30.3	145	40.6 *	253	35.5
Legume	61	17.1	100	28.0 *	161	22.6
G/Y vegetable	184	51.7	255	71.4 *	439	61.6
Milk, dairy product	246	69.1	246	68.9	492	69.0
Seaweed	33	9.3	56	15.7 *	89	12.5

*Significantly different between gender ($p < 0.05$)**Table 5.** NEO-FFI score.

NEO-FFI (Scale)	Male (n=356)	Female(n=357)
	Mean $\pm$ SD	Mean $\pm$ SD
Neuroticism	25.3 $\pm$ 6.9	25.2 $\pm$ 6.4
Extraversion	25.4 $\pm$ 6.0	26.6 $\pm$ 5.5
Openness	28.6 $\pm$ 5.8	29.8 $\pm$ 5.4*
Agreeableness	28.7 $\pm$ 5.1	30.2 $\pm$ 4.9*
Conscientiousness	26.0 $\pm$ 5.8	26.5 $\pm$ 6.2

*Significantly different between gender ($p < 0.05$)

Figure 1. Distribution of each NEO-FFI score by sex.

Table 6. Interrelation coefficients among NEO-FFI scales New students (n=713)

	Extraversion	Openness	Agreeableness	Conscientiousness
Neuroticism	-0.24 **	0.02	-0.31 **	-0.27 **
Extraversion		0.01	0.16 **	0.27 **
Openness			0.00	0.00
Agreeableness				0.24 **

**p<0.01

Table 7. Odds ratios between lifestyle, dietary habit and tertial score of NEO-FFI.

Neuroticism (High score vs. Low score)		Male OR	95%CI	Female OR	95%CI
Current health status	Healthy/Not healthy	0.32	(0.15-0.70)	0.47	(0.19-1.15)
Desire for health	Hope better health /Indifference	0.77	(0.39-1.55)	0.87	(0.43-1.77)
Desire for information about health promotion	Yes/None	1.78	(0.89-3.56)	2.13	(0.79-5.80)
Smoking	Smoker/Non smoker	0.43	(0.23-0.81)	n.a.	
Alcohol	Drinker/No drinker	0.65	(0.38-1.10)	1.04	(0.63-1.71)
Sleeping hours	≥ 7hr/<7hr	1.02	(0.61-1.71)	1.27	(0.79-2.06)
Living status	With family/Alone	1.08	(0.63-1.84)	0.96	(0.58-1.61)
Self symptoms	Yes/None	5.18	(2.77-9.69)	3.19	(1.69-6.02)
Rest	Sufficient/Deficient	0.44	(0.24-0.82)	0.48	(0.26-0.89)
Exercise	Yes/None	0.51	(0.30-0.85)	1.00	(0.56-1.78)
Practice to promote health	Yes/None	0.98	(0.57-1.69)	1.09	(0.61-1.94)
Daily take of breakfast	Yes/None	1.03	(0.61-1.73)	0.47	(0.22-1.03)
Eating time	Regular/Irregular	0.59	(0.34-1.02)	0.63	(0.39-1.03)
Snack between meals	Take/Not take	1.82	(1.05-3.17)	1.10	(0.60-2.03)
Eating volume	To full/Moderate	1.38	(0.82-2.30)	1.33	(0.82-2.16)
Avoidance of salty foods	Yes/None	0.75	(0.45-1.26)	1.38	(0.85-2.23)
Daily intake of;	Meat	0.80	(0.48-1.34)	1.31	(0.80-2.14)
	Fish	0.89	(0.34-2.33)	0.81	(0.44-1.50)
	Egg	0.78	(0.44-1.37)	1.23	(0.75-2.00)
	Legume	0.84	(0.44-1.59)	0.71	(0.42-1.21)
	G/Y vegetable	1.64	(0.38-1.07)	1.06	(0.62-1.81)
	Milk, dairy product	1.52	(0.88-2.64)	0.98	(0.58-1.66)
	Seaweed	0.53	(0.21-1.36)	0.83	(0.44-1.58)

(Continued)

Extraversion (High score vs. Low score)		Male OR	95%CI	Female OR	95%CI
Current health status	Healthy/Not healthy	6.26	(1.46-26.82)	5.24	(1.22-22.60)
Desire for health	Hope better health /Indifference	1.53	(0.60-3.86)	2.75	(0.93-8.09)
Desire for information about health promotion	Yes/None	0.92	(0.42-2.01)	0.71	(0.28-1.81)
Smoking	Smoker/Non smoker	2.24	(1.13-4.43)	n.a.	
Alcohol	Drinker/No drinker	0.90	(0.48-1.68)	1.27	(0.71-2.25)
Sleeping hours	≥ 7hr/<7hr	1.71	(0.91-3.23)	1.04	(0.59-1.82)
Living status	With family/Alone	1.07	(0.55-2.07)	0.64	(0.35-1.17)
Self symptoms	Yes/None	0.59	(0.31-1.13)	0.44	(0.24-0.82)
Rest	Sufficient/Deficient	1.20	(0.57-2.50)	1.01	(0.51-1.99)
Exercise	Yes/None	3.38	(1.76-6.49)	2.12	(1.11-4.06)
Practice to promote health	Yes/None	1.70	(0.85-3.41)	1.08	(0.54-2.15)
Daily take of breakfast	Yes/None	1.46	(0.75-2.84)	1.14	(0.44-2.94)
Eating time	Regular/Irregular	0.89	(0.46-1.73)	0.92	(0.53-1.60)
Snack between meals	Take/Not take	0.61	(0.32-1.15)	1.62	(0.77-3.43)
Eating volume	To full/Moderate	1.26	(0.68-2.33)	1.49	(0.85-2.61)
Avoidance of salty foods	Yes/None	1.51	(0.81-2.82)	0.73	(0.42-1.28)
Daily intake of;	Meat	3.72	(1.87-7.42)	1.59	(0.90-2.80)
	Fish	0.46	(0.10-2.04)	1.26	(0.64-2.47)
	Egg	1.36	(0.72-2.59)	1.34	(0.77-2.34)
	Legume	2.16	(1.04-4.46)	1.08	(0.59-1.99)
	G/Y vegetable	1.65	(0.87-3.11)	1.00	(0.53-1.86)
	Milk, dairy product	0.74	(0.38-1.43)	1.01	(0.56-1.85)
	Seaweed	2.08	(0.84-5.15)	0.82	(0.38-1.75)

(Continued)

Openness (High score vs. Low score)		Male OR	95%CI	Female OR	95%CI
Current health status	Healthy/Not healthy	0.89	(0.43-1.84)	0.27	(0.04-2.06)
Desire for health	Hope better health /Indifference	1.25	(0.60-2.61)	1.60	(0.60-4.22)
Desire for information about health promotion	Yes/None	1.56	(0.78-3.10)	2.20	(0.68-7.11)
Smoking	Smoker/Non smoker	0.48	(0.26-0.90)	n.a.	
Alcohol	Drinker/No drinker	1.09	(0.62-1.93)	0.74	(0.34-1.59)
Sleeping hours	≥ 7hr/<7hr	0.55	(0.32-0.97)	1.07	(0.49-2.32)
Living status	With family/Alone	0.87	(0.49-1.54)	1.17	(0.51-2.69)
Self symptoms	Yes/None	1.63	(0.92-2.89)	2.58	(1.14-5.82)
Rest	Sufficient/Deficient	0.83	(0.43-1.61)	1.15	(0.49-2.73)
Exercise	Yes/None	0.95	(0.55-1.65)	1.06	(0.41-2.74)
Practice to promote health	Yes/None	2.28	(1.30-4.01)	2.07	(0.93-4.64)
Daily take of breakfast	Yes/None	1.48	(0.85-2.57)	0.95	(0.27-3.36)
Eating time	Regular/Irregular	1.11	(0.61-2.00)	0.79	(0.37-1.71)
Snack between meals	Take/Not take	0.67	(0.37-1.22)	1.66	(0.69-3.99)
Eating volume	To full/Moderate	1.06	(0.61-1.83)	1.64	(0.76-3.54)
Avoidance of salty foods	Yes/None	1.14	(0.65-2.00)	1.64	(0.75-3.60)
Daily intake of;	Meat	1.00	(0.56-1.69)	3.55	(1.31-9.60)
	Fish	1.17	(0.41-3.39)	1.22	(0.44-3.38)
	Egg	0.87	(0.49-1.55)	1.03	(0.47-2.23)
	Legume	2.60	(1.10-6.12)	1.26	(0.54-2.97)
	G/Y vegetable	1.03	(0.59-1.78)	1.71	(0.77-3.80)
	Milk, dairy product	1.53	(0.86-2.74)	3.15	(1.45-6.83)
	Seaweed	2.82	(0.81-9.84)	1.96	(0.57-6.87)

(Continued)

Agreeableness (High score vs. Low score)		Male OR	95%CI	Female OR	95%CI
Current health status	Healthy/Not healthy	2.00	(0.90-4.45)	1.97	(0.78-4.99)
Desire for health	Hope better health /Indifference	2.22	(1.01-4.88)	1.99	(0.91-4.35)
Desire for information about health promotion	Yes/None	0.80	(0.32-1.97)	1.15	(0.46-2.90)
Smoking	Smoker/Non smoker	0.89	(0.43-1.86)	n.a.	
Alcohol	Drinker/No drinker	0.75	(0.39-1.46)	0.52	(0.29-0.91)
Sleeping hours	≥ 7hr/<7hr	0.76	(0.40-1.44)	0.49	(0.28-0.87)
Living status	With family/Alone	0.52	(0.26-1.04)	1.06	(0.59-1.91)
Self symptoms	Yes/None	0.74	(0.37-1.48)	0.61	(0.31-1.21)
Rest	Sufficient/Deficient	2.94	(1.46-5.92)	1.10	(0.57-2.15)
Exercise	Yes/None	1.15	(0.61-2.20)	1.04	(0.52-2.08)
Practice to promote health	Yes/None	1.22	(0.63-2.37)	1.18	(0.62-2.25)
Daily take of breakfast	Yes/None	1.11	(0.58-2.14)	1.35	(0.62-2.94)
Eating time	Regular/Irregular	2.17	(1.05-4.48)	1.80	(1.03-3.14)
Snack between meals	Take/Not take	0.73	(0.37-1.43)	1.22	(0.63-2.36)
Eating volume	To full/Moderate	1.00	(0.52-1.86)	0.78	(0.45-1.36)
Avoidance of salty foods	Yes/None	1.27	(0.66-2.42)	1.54	(0.89-2.70)
Daily intake of;	Meat	1.25	(0.66-2.37)	0.88	(0.50-1.54)
	Fish	0.45	(0.16-1.25)	1.06	(0.55-2.05)
	Egg	1.16	(0.58-2.33)	1.05	(0.61-1.82)
	Legume	0.45	(0.21-0.98)	1.27	(0.70-2.33)
	G/Y vegetable	1.19	(0.63-2.26)	1.82	(1.00-3.34)
	Milk, dairy product	0.80	(0.40-1.63)	1.19	(0.66-2.18)
	Seaweed	0.65	(0.23-1.84)	1.48	(0.68-3.23)

(Continued)

Conscientiousness (High score vs. Low score)		Male OR	95%CI	Female OR	95%CI
Current health status	Healthy/Not healthy	6.04	(1.42-25.71)	1.41	(0.60-3.27)
Desire for health	Hope better health /Indifference	11.46	(1.54-85.10)	2.88	(1.17-7.11)
Desire for information about health promotion	Yes/None	0.83	(0.39-1.80)	1.91	(0.74-4.92)
Smoking	Smoker/Non smoker	0.55	(0.24-1.23)	n.a.	
Alcohol	Drinker/No drinker	0.72	(0.39-1.35)	1.22	(0.72-2.06)
Sleeping hours	≥ 7hr/<7hr	0.84	(0.45-1.55)	1.82	(1.08-3.08)
Living status	With family/Alone	1.08	(0.56-2.08)	1.00	(0.58-1.73)
Self symptoms	Yes/None	0.28	(0.15-0.53)	0.62	(0.34-1.16)
Rest	Sufficient/Deficient	1.46	(0.67-3.18)	0.58	(0.32-1.05)
Exercise	Yes/None	2.30	(1.22-4.35)	2.04	(1.03-4.03)
Practice to promote health	Yes/None	2.81	(1.26-6.27)	1.26	(0.70-2.30)
Daily take of breakfast	Yes/None	0.59	(0.34-1.02)	1.85	(0.82-4.16)
Eating time	Regular/Irregular	2.66	(1.42-1.98)	2.20	(1.31-3.71)
Snack between meals	Take/Not take	0.71	(0.37-1.33)	0.69	(0.36-1.36)
Eating volume	To full/Moderate	0.57	(0.30-1.08)	0.63	(0.37-1.06)
Avoidance of salty foods	Yes/None	2.09	(1.11-3.91)	1.87	(1.11-3.16)
Daily intake of;	Meat	2.38	(1.23-4.61)	0.60	(0.35-1.03)
	Fish	0.99	(0.32-3.03)	1.20	(0.66-2.39)
	Egg	2.27	(1.20-4.26)	1.01	(0.60-1.68)
	Legume	2.01	(0.98-4.14)	1.48	(0.84-2.60)
	G/Y vegetable	2.13	(1.11-4.08)	1.56	(0.89-2.71)
	Milk, dairy product	1.10	(0.56-2.17)	0.93	(0.54-1.60)
	Seaweed	3.24	(1.45-7.27)	1.84	(0.92-3.67)

ing hours (≥ 7 / < 7 OR=0.55, 95%CI=0.32-0.97), greater participation in health promoting practices (OR=2.28, 95%CI=1.30-4.01), and greater daily intake of legumes (OR=2.60, 95%CI=1.10-6.12). High score group of female students had more self complaints about their health (OR=2.58, 95%CI=1.14-5.82), daily intake of meat (OR=3.55, 95%CI=1.31-9.60), and milk and dairy product (OR=3.15, 95%CI=1.45-6.83).

Agreeableness: High scorers for both males and females had meals at regular times (OR=2.17, 1.80, respectively). They tended to have less drinking, sleep, and self-complaints. High score group of male students had a higher desire to achieve better health (OR=2.22, 95%CI=1.01-4.88), considered themselves as having sufficient rest (OR=2.94, 95%CI=1.46-5.92), and showed a lower prevalence of daily intake of legumes (OR=0.45, 95%CI=0.21-0.98). High score group of female students showed no drinking (OR=0.52, 95%CI=0.29-0.91), less sleeping hours (OR=0.49, 95%CI=0.28-0.87), and greater daily intake of green-yellow vegetables (OR=1.82, 95%CI=1.00-3.34).

Conscientiousness: High scoring students had a self-assessment of being healthy (OR=6.04, 95%CI=1.42-25.71 in males, OR=1.41, 95%CI=0.60-3.27 in females, respectively), and had strong desire for health (OR=11.46, 95%CI=1.54-85.10 in males, OR=2.88, 95%CI=1.17-7.11 in females, respectively), and performed more exercise (OR=2.30, 95%CI=1.22-4.35 in males, OR=2.04, 95%CI=1.03-4.03 in females, respectively). They participated more in health promoting practices (OR=2.81, 95%CI=1.26-6.27 in males, OR=1.26, 95%CI=0.70-2.30 in females, respectively), had meals at regular times (OR=2.66, 2.20, for males and females, respectively), and avoided salty foods (OR=2.09, 1.87 for males and females, respectively).

DISCUSSION

Behaviorism is a psychological perspective with a long history but has not been adequately considered in relationship to personality. Behaviorists have usually studied the external determinants of behavior, such as environmental stimuli and rewards⁵. The stress-illness relationship between physical illness and psychological or emotional maladjustment have been found to follow life event stress⁶. Stress could predispose a person to disease through changes in the immune system, disruptions in health practices, such as inadequate sleep or a poor diet, or by leading to behaviors that increase exposure to infectious agents⁷.

The influence of personality on health consciousness has not been well studied, but would appear to merit consideration as behavior modification can be influenced by personality. Psychological well-adjusted, extraverted, agreeable, conscientious, and emotional stable persons were more positively judged than those who were low on these characteristics.

Although various researchers have used different terms, the five-factor model provides the important dimensions of individual differences and offers an organizing framework for personality research⁸. A self-reported questionnaire, the NEO Personality Inventory (NEO-PI-R), was developed specifically to measure these five factors⁹. NEO-FFI, is shortened version of NEO-PI-R, and composed of 60 questions¹⁰. The five factors are not entirely mutually independent, as has been shown in the American Study¹¹. Extraversion and Openness are positively correlated, while Neuroticism and Conscientiousness are negatively correlated. Other correlations are small. In our study, E and A, E and C, A and C are positively correlated (0.16, 0.27, 0.24, $p < 0.01$), and N and E, N and A, N and C are negatively correlated (-0.24, -0.31, -0.27, $p < 0.01$) (Table 6). Reflecting these correlations, each high score group except for Neuroticism and Openness had better self-assessed current health status, and greater participation in exercise.

Health habits and attitudes are important areas in which personality variables may intervene. Individuals high in Neuroticism are more likely to smoke and less likely to quit¹². The NEO-PI Impulsiveness scale was effective in one study in predicting which post-coronary patients would relapse to smoking six months after they had quit on physician's advice¹³. There is some evidence that conscientiousness may be positively related to good health habits¹⁴. Our study showed a similar trend. Prediction of health behaviors and of compliance with health instructions is important not only for an understanding of these processes, but also for identifying individuals who are more likely to benefit from a program, or who are in need of more intensive intervention efforts.

Personality was considered to be unchanged throughout life. The younger in life that people are studied, and the longer the time between measures, however, the more changes are found¹⁵⁻¹⁷. Even in the two decades from college to middle adulthood, considerable change was reported¹⁸. We will attempt to follow up on the present participants in the future, and it can be expected that the changes in personality would be reflected in levels of health consciousness.

'Self' is now considered as a holistic or integrative concept of a higher order of motives or habits, which is integrated or unified in a healthy personality¹⁹. Modern personality approaches are emphasizing this organizing function of the self²⁰. For instance, a healthy tendency to develop 'self' fully, despite social forces that work against healthy development are recognized. When people try to "think positively", they generally believe they will be rewarded with a desirable outcome. In our study, significantly high ORs for health consciousness were obtained in E and C group. On the contrary, high N and O group showed a low health consciousness. Health consciousness is considered to be an integration of life habits. A low number of self complaints, more exercise, greater participation in health promoting practices, a good health status a stronger desire for health, and dietary considerations such as avoidance

of salty foods, daily intake of various health supporting foods, are recognized in high C score group.

These findings suggested that in the effective practice of health education and in evaluation of behavior modifications to maintain optimum health and to prevent diseases, the personality of the targeted individual needs to be considered.

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