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.

A well-balanced lifestyle of proper nutrition, exercise, and rest is shown to be effective for prevention of disease and promotion of good health 2. 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,
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) 6, 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 \( \chi^2 \) test.

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

| Category                        | Question                                      |
|---------------------------------|-----------------------------------------------|
| Physical characteristics        | Height, Body Weight                           |
|                                 | Smoking                                       |
|                                 | Alcohol                                       |
|                                 | Sleeping hours                                |
|                                 | Living status                                 |
| Lifestyle                       | Current health status                         |
| Health consciousness            | 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
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±1.7 and 18.6 yr±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-

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

Table 2. Number of participants.
Health Consciousness and Personality

Table 3. Physical characteristics of participants and lifestyle.

| Physical characteristics | Male n=356 | Female n=357 |
|--------------------------|------------|--------------|
| Age                      | 18.9 ± 1.7 | 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%) | 5 (1.4%)     |
| Ex-smoker                | 22 (6.2%)  | 11 (3.1%)    |
| Non-smoker               | 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 (%)

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. 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. 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. 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Table 4-1. Health consciousness.

| Health consciousness          | Male   | %    | Female | %    | Total | %    |
|------------------------------|--------|------|--------|------|-------|------|
|                              | n      |      | n      |      | n     |      |
| 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.

| Self symptoms                  | Male   | %    | Female | %    | Total | %    |
|--------------------------------|--------|------|--------|------|-------|------|
|                                | n      |      | n      |      | n     |      |
| 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.

| Practice | 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 | Male | Female | Total |
|--------------------------|------|--------|-------|
|                          | n    | %     | n     | %     | n     | %     |
| 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

| Eating time | Male | Female | Total |
|-------------|------|--------|-------|
|             | n    | %     | n     | %     | n     | %     |
| Regular     | 119  | 33.4  | 174  | 48.7* | 293  | 41.1  |
| Irregular   | 237  | 66.6* | 183  | 51.3  | 420  | 58.9  |

Snack between meals

| Snack between meals | Male | Female | Total |
|---------------------|------|--------|-------|
| Not take            | 122  | 34.3* | 72    | 20.2  | 194  | 27.2  |
| Take                | 234  | 65.7  | 283  | 79.3* | 517  | 72.5  |

Eating volume

| Eating volume | Male | Female | Total |
|---------------|------|--------|-------|
|               | n    | %     | n     | %     | n     | %     |
| 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

| Avoidance of salty foods | Male | Female | Total |
|--------------------------|------|--------|-------|
|                          | n    | %     | n     | %     | n     | %     |
| Yes | 152  | 42.7  | 170  | 47.6  | 322  | 45.2  |
| No  | 202  | 56.7  | 181  | 50.7  | 383  | 53.7  |

Daily intake of;

| Daily intake of | Male | Female | Total |
|-----------------|------|--------|-------|
|                 | n    | %     | n     | %     | n     | %     |
| 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±SD      | Mean±SD       |
| Neuroticism     | 25.3 ± 6.9   | 25.2 ± 6.4    |
| Extraversion    | 25.4 ± 6.0   | 26.6 ± 5.5    |
| Openness        | 28.6 ± 5.8   | 29.8 ± 5.4*   |
| Agreeableness   | 28.7 ± 5.1   | 30.2 ± 4.9*   |
| Conscientiousness | 26.0 ± 5.8   | 26.5 ± 6.2    |

*Significantly different between gender (p<0.05)
Table 6. Intercorrelation coefficients among NEO-FFI scales New students (n=713)

| NEO-FFI Scale       | Extraversion | Openness | Agreeableness | Conscientiousness |
|---------------------|--------------|----------|---------------|-------------------|
| Neuroticism         | -0.24 **     | 0.02     | -0.31 **      | -0.27 **          |
| Extraversion        |              |          | 0.16 **       | 0.27 **           |
| Openness            |              |          |               | 0.00              |
| Agreeableness       |              |          |               | 0.24 **           |
| Conscientiousness   |              |          |               |                   |

**p<0.01

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

| Lifestyle, Dietary Habit | Male OR 95%-CI | Female OR 95%-CI |
|--------------------------|----------------|------------------|
| Current health status    |                |                  |
| Healthy/Not healthy      | (0.15-0.70)    | (0.19-1.15)      |
| Healthy/Not healthy      | 0.47           | (0.19-1.15)      |
| Hope better health       | (0.39-1.55)    | (0.43-1.77)      |
| In-difference            | 0.87           | (0.43-1.77)      |
| Desire for information   |                |                  |
| Yes/None                 | 1.78           | (0.89-3.56)      |
| Sufficient/Deficient     | (0.24-0.82)    | (0.26-0.89)      |
| Exercise                 | (0.30-0.85)    | (0.56-1.78)      |
| Practice to promote health | (0.57-1.69)   | (0.61-1.94)      |
| Daily take of breakfast  |                |                  |
| Yes/None                 | 1.03           | (0.61-1.73)      |
| Snack between meals      |                |                  |
| Take/Not take            | (1.05-3.17)    | (1.06-2.03)      |
| Eating volume            |                |                  |
| Yes/None                 | 1.38           | (0.82-2.30)      |
| Avoidance of salty foods |                |                  |
| Yes/None                 | 0.75           | (0.45-1.26)      |
| Daily intake of;         |                |                  |
| Meat                     | 0.80           | (0.48-1.34)      |
| Fish                     | 0.89           | (0.34-2.33)      |
| Egg                      | 0.78           | (0.44-1.37)      |
| Legume                   | 0.84           | (0.44-1.59)      |
| G/Y vegetable            | 1.64           | (0.38-1.07)      |
| Milk, dairy product      | 1.52           | (0.88-2.64)      |
| Seaweed                  | 0.53           | (0.21-1.36)      |

*p<0.01 between M and F.
### Health Consciousness and Personality

(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.    | (0.36-7.83)  |
| 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.    | (0.34-1.59)  |
| 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)  |
### 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 | 2.22 (1.01-4.88) | 1.99 (0.91-4.35) | |
|                          | /Indifference |           |           | |
| **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) | |
|                          | Yes/None | 1.15 (0.61-2.20) | 1.04 (0.52-2.08) | |
| **Exercise**             | Yes/None | 1.22 (0.63-2.37) | 1.18 (0.62-2.25) | |
| **Practice to promote health** | Yes/None | 1.11 (0.58-2.14) | 1.35 (0.62-2.94) | |
| **Daily take of breakfast** | Yes/None | 1.80 (1.05-3.48) | 1.40 (0.72-2.70) | |
| **Eating time**          | Regular/Irregular | 1.00 (0.52-1.86) | 0.78 (0.45-1.36) | |
| **Snack between meals**  | Take/Not take | 0.73 (0.37-1.43) | 1.22 (0.63-2.36) | |
| **Eating volume**        | To full/Moderate | 1.27 (0.66-2.42) | 1.54 (0.89-2.70) | |
| **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) | |

### 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 | 11.46 (1.54-85.10) | 2.88 (1.17-7.11) | |
|                          | /Indifference |           |           | |
| **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 (1.42-4.67) | 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) | |
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=0.49, 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 rewards. The stress-illness relationship between physical illness and psychological or emotional maladjustment have been found to follow life event stress. 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 agents.

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 research. A self-reported questionnaire, the NEO Personality Inventory (NEO-PI-R), was developed specifically to measure these five factors. NEO-FFI, is shortened version of NEO-PI-R, and composed of 60 questions. The five factors are not entirely mutually independent, as has been shown in the American Study. 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 quit. 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 advise. There is some evidence that conscientiousness may be positively related to good health habits. 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 found. Even in the two decades from college to middle adulthood, considerable change was reported. 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 personality. Modern personality approaches are emphasizing this organizing function of the self. 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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