# RESEARCH COMMUNICATION

# Factors Related to Self-perception of Diet Quality among South Korean Adults

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## Abstract

Objective: Improvements in diet can decrease the cancer rates. The aim of the present study was to determine the relationships between self-perception of diet quality and personality, impulsiveness, stress, coping strategy, sense of coherence, self-efficacy, and social support. Methods: This cross-sectional study was conducted using a multiple-stratified random sampling method based on the Korea Census of 2007. In October 2009, investigators conducted 15-minute face-to-face interviews with 1,530 South Korean volunteers who ranged from 30 to 69 years of age without a history of cancer. Results: Respondents were more likely to perceive that they consumed a healthy diet if they were older than 50 years, lived with a partner, had a monthly family income greater than $4,000 USD, had a low perceived risk of cancer, consumed less alcohol, exercised regularly, had a less agreeable or conscientious personality, had low stress levels, had a high sense of coherence or self-efficacy, and had ample social support. Conclusion: Psychosocial factors, such as personality, stress, sense of coherence, self-efficacy, and social support, are associated with the self-perception of diet quality. Analysis of the factors that contribute to a perceived healthy diet could assist with the design of educational campaigns.

Key words: Personality - stress - sense of coherence - self-efficacy - social support - self-perception of diet quality

## Introduction

Dietary factors are estimated to account for approximately 20% to 30% of cancers (Willett, 1995). Improvements in diet can therefore decrease the cancer rates, particularly if this improvement is accompanied by decreases in infections and other risk factors for cancer (WHO, 2003). The incidence of certain cancers is low in populations that consume substantial quantities of vegetables and fruit (Palli, 2000; WCRF&AICR, 1997). There is also evidence indicating that preserved meats, salt-preserved foods and excess dietary salt increase the risk of cancer (Norat, 2002). The public should be encouraged to prevent cancer via consumption of a nutritionally adequate and diverse diet (WHO, 2003). It is therefore important to assess the personal and social factors that influence dietary behavior.

Psychosocial factors such as personality, stress and coping, Sense of Coherence (SOC), self-efficacy, and social support are thought to alter patterns of health-related behaviors that are directly related to health risks such as smoking, alcohol consumption, and physical activity (Steptoe et al., 1996; Siqueira et al., 2001; Kuuppelomaki et al., 2003; Ng et al., 2003; Williams

et al., 2008). However, few studies have examined associations these factors with dietary intake. In 2007, the National Cancer Center in Korea developed ten codes for cancer prevention for Koreans. Among them, one item includes healthy diet, which is defined as "Consuming a diverse, well-balanced diet that included sufficient amounts of fruits and vegetables." Identifying the psychosocial factors influencing healthy diet can lead the researchers and practitioners to tailor the message and intervene while considering the individual's condition. It has been established that certain personality traits, such as impulsiveness, are associated with the onset and progression of unhealthy behaviors (Guerrieri et al., 2007; Williams et al., 2008; Conner et al., 2009; Welch et al., 2009; Yen et al., 2009). Interventions that foster personality change may effectively reduce risky behaviors and reveal the appropriate targets for intervention strategies. However, few studies have investigated the influences of personality and impulsiveness on a healthy diet.

Interestingly, stress modifies behaviors, such as food choices and psychophysiological processes, that influence health (Oliver et al., 1999; Adam et al., 2007). The impact of stress on behavior varies depending on

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the type and severity of stressors. Studies using acute and mildly arousing stressors report overeating and more severe or chronic stressors decreases food intake in animals (Krebs et al., 1996). Human studies have shown that chronic life stress results in higher energy and fat intake, thereby contributing to the development of obesity (Walcott-McQuigg, 1995; Laitinen et al., 2002; Ng et al., 2003). The impact of stressful life events on health behaviors may be buffered by a third factor. Siqueira et al. (2001) reported that smokers were significantly less likely to use cognitive coping methods, and Veenstra et al. (2007) reported that emotional coping can be regarded as a vulnerability factor in the relationship between life events and alcohol use. However, few studies have characterized the relationship between stress, coping strategy and a healthy diet.

SOC, including comprehensibility, manageability and meaningfulness, is a term that describes an individual's view of the world (Mccubbin et al., 1998). High SOC suggests that an individual possesses resources that enable him or her to cope with various types of stressful life events. A number of studies have shown that strong SOC correlates positively with high quality of life (Borglin et al, 2006; Drageset et al., 2009), good self-reported health (Sanden-Eriksson, 2000; von Bothmer et al., 2003), and physical health (Bergh et al., 2006). The relationship between SOC and specific health behaviors, such as diet, remains unclear, although previous studies have shown that the strength of SOC is related to physical activity (Kuuppelomaki et al., 2003) and current smokers have a lower mean SOC (Igna et al., 2008).

Humans are social creatures who are sustained and affected by interactions with their environments, including other people. Diet is influenced by a range of environmental factors, including social support (Bandura, 1986; Booth, et al., 2005; Thornton, et al., 2006); therefore, confidence in overcoming the barriers to healthy dietary behavior could be influenced by social support and other means of affective reinforcement (Bandura, 1986; Sheeshka et al., 1993). Several studies have shown that social support is associated with healthy behaviors such as smoking cessation (Wagner et al., 2004; Turner et al., 2008; Vaananen et al., 2008; Lawhon et al., 2009), reducing alcohol consumption (Steptoe et al., 1996; Hagihara et al., 2003), increasing physical activity (Spanier et al., 2001; Okun et al., 2003; Anderson et al., 2006; Kanu et al., 2008), and cancer screening (Seow et al., 2000; Katapodi et al., 2002). These studies have found that people with a high level of social support were more likely to quit risky health behaviors and engage in health-promoting behaviors. Few studies have investigated the influence of social support on a healthy diet, although it has been shown that lack of emotional, instrumental, and informational support contribute to unhealthy diets among pregnant women (Thornton et al., 2006). Therefore, the aim of the present study was to determine the relationships between self-perception of diet quality and personality,

impulsiveness, stress, coping strategy, SOC, self-efficacy, and social support. We hypothesized that personality will influence the self-perception of diet quality and that stress will be negatively associated with a perceived healthy diet, while SOC, self-efficacy, and social support will be positively associated with self-perception of diet quality.

## Materials and Methods

### Design and sample

This cross-sectional study was conducted using a multiple-stratified random sampling methods based on the Korea Census of 2007 to obtain a nationally representative sample. The enumeration districts were selected based upon administrative districts and their size. Three to eight households were chosen randomly in an enumeration district and one eligible person per household was selected as a respondent.

In October 2009, investigators from a professional research agency conducted 15-minute face-to-face interviews with 1,530 participants aged 30 or older who did not have a family history of cancer. Study recruitment involved door-to-door contact. We made at least two attempts to contact a resident at each dwelling. We sampled 4,202 potential study candidates and 3,213 were reached (76.5%). Among them, 2,855 were eligible (88.9%). Of those eligible, 1,102 refused (38.6%) and 223 did not complete the interview (7.8%). Finally, interviews were completed by 1,530 participants (53.6%). Each respondent was given a small, free gift worth $20.

Information about dietary behaviors, personality, impulsiveness, stress, coping strategy, SOC, self-efficacy, social support, demographic and socioeconomic factors, and other health-related characteristics were collected. The study was approved by the Institute of Research Board of the Korean National Cancer Center, and written informed consent was obtained from all study participants.

### Self-perception of diet quality

Perceived dietary behavior was assessed with one binary yes/no question by asking participants to indicate whether they consumed a diverse, well-balanced diet that included sufficient amounts of fruits and vegetables. "Consuming a diverse, well-balanced diet that included sufficient amounts of fruits and vegetables" is one of the items from the ten codes for cancer prevention for Koreans developed by the National Cancer Center in Korea.

### Personality

Personality was assessed using the Ten-Item Personality Inventory (TIPI), which shows adequate convergent and discriminate validity, test-retest reliability, and patterns of external correlates (Gosling et al., 2003). This self-reported questionnaire consists of ten statements and is composed of two descriptors that assess

the five basic dimensions of personality: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. Each item is rated on a seven-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (7). Gosling reported the test-retest correlations were from 0.76 to 0.83 (Gosling et al., 2003).

## Impulsiveness

Impulsiveness was assessed using the Korean version of the Barratt Impulsiveness Scale, adapted by Chung (Chung et al., 1997). Chung identified three subfactors of the Barratt Impulsiveness Scale — cognitive, motor, and non-planning impulsiveness — in Korean university students and showed that there was no significant difference between their levels of impulsivity and their American peers (Chung et al., 1997). This instrument consists of 23 items that are rated on a four-point Likert scale ranging from 'never' (1) to 'always' (4). The total score can range from 23 to 92. The Cronbach alpha coefficient was 0.79 in the current study.

## Stress

Stress was assessed using the psychosocial well-being index – short form (PWI-SF), which was developed by Chang (2000). The PWI-SF consists of 18 items that are each scored on a four-point Likert scale ranging from 'strongly disagree' (0) to 'strongly agree' (3). The total score can range from 0 to 54. Respondents with scores of less than 9, from 9 to 27, and more than 27 were classified as low, moderate, and high stress groups, respectively. A feasibility study of PWI-SF was made on Korean laborers and the general public (Chang, 2000). The Cronbach alpha coefficient was 0.87 in the current study.

## Coping strategy

Coping strategy was assessed using the Coping Strategy Indicator developed by Amirkhan (Amirkhan, 1990). The CSI is self-report measure containing 33 items that assess three coping strategies: social support seeking, problem solving, and avoidance. Each coping strategy is rated on three-point Likert scale ranging from 'never' (1) to 'much' (3), and the total score can range from 33 to 99. Shin investigated the cross-cultural validity of the CSI. Factor analysis in both the American and Korean samples yields a clear three-factor solution with the same factor structure (Shin et al., 2002). The Cronbach alpha coefficients were 0.84, 0.86, 0.76 for social support seeking, problem solving, and avoidance, respectively.

## Sense of coherence

Sense of coherence was assessed using the Sense of Coherence Scale (SOC-13) developed by Antonovsky (Antonovsky, 1993). This tool consists of a seven-point Likert scale ranging from 'never' (1) to 'very often' (7) and the total score can range from 13 to 91. A systematic review of the validity and reliability of the SOC-13 scale showed that the α values ranged from 0.70 to 0.92 and test-retest correlations ranged from 0.69 to 0.78 (Eriksson

et al., 2005). The Cronbach alpha coefficient was 0.77 in the current study.

## Self-efficacy

Self-efficacy was assessed by asking participants to indicate whether they were capable of consuming a diverse, balanced diet with sufficient fruits and vegetables. One item was rated on a seven-point Likert scale ranging from 'never confident' (1) to 'strongly confident' (7). Three groups were created based on the tertile scores.

## Social support

Social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS), which was developed by Zimet et al. (1988). The MSPSS consists of 12 perceived social support items and contains three subscales that assess support from 'family', 'friends', and 'significant others'. Each item was rated on a five-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5), and the total score ranged from 12 to 60. Zimet reported that perceived support was significantly inversely related to both depression and anxiety to prove the construct validity (Zimet et al., 1988). The Cronbach alpha coefficient was 0.92 in the current study.

## Health-related characteristics

Family history of cancer was measured with one binary yes/no question by asking participants to indicate whether they have cancer patients among their family members. To measure perceived cancer risk, each participant was asked the following question: 'Compared with the average person of your age, what do you think are your chances of developing cancer?' Responses were graded on a five-point Likert scale ranging from 'much lower' (1) to 'much higher' (5). Responses were recorded using a three-point scale, with 'much lower' and 'lower' recorded as 'lower', 'moderate' recorded as 'moderate', and 'higher' and 'much higher' recorded as 'higher'. With regard to smoking status, the participants were classified as 'smokers' if they smoked currently, 'nonsmokers' if they had never smoked or had previously smoked but currently did not smoke. To measure drinking status, participants were asked to answer yes or no to the following question: 'Do you consume less than two drinks per day of any alcoholic beverage?' Exercise was measured by answering yes or no to the following question: 'Do you participate in any type of physical activity that makes you sweat for a total of at least 30 minutes per day, five times per week?' The American Cancer Society recommends that adults engage in at least 30 minutes of moderate to vigorous physical activity, above usual activities, on five or more days per week to reduce the risk of cancers (Kushi et al., 2006).

## Analysis

The chi-square test was used to assess the relationships

**Table 1. Participant Characteristics by Diet Quality**

| Variables | Total n(%) | Healthy diet n(%) | Non-health diet n(%) | p* |
|---|---|---|---|---|
| Total | 1,530(100.0) | 966(63.1) | 564(36.9) | |
| **Gender** | | | | |
| Male | 764(49.9) | 452(46.8) | 312(55.3) | 0.001 |
| Female | 766(50.1) | 514(53.2) | 252(44.7) | |
| **Age, yr** | | | | |
| 30-39 | 469(30.7) | 267(27.6) | 202(35.8) | 0.000 |
| 40-49 | 481(31.4) | 289(29.9) | 192(34.0) | |
| 50-59 | 339(22.2) | 235(24.3) | 104(18.4) | |
| 60-69 | 241(15.8) | 175(18.1) | 66(11.7) | |
| **Education (missing = 8)** | | | | |
| <High school | 311(20.4) | 206(21.5) | 105(18.7) | 0.422 |
| High school graduate | 740(48.6) | 459(47.8) | 281(50.0) | |
| College graduate | 471(30.9) | 295(30.7) | 176(31.3) | |
| **Marital status** | | | | |
| Uncoupled | 203(13.3) | 94(9.7) | 109(19.3) | 0.000 |
| Coupled | 1,327(86.7) | 872(90.3) | 455(80.7) | |
| **Monthly family income, $ (missing = 19)** | | | | |
| <2.000 | 318(21.0) | 182(19.2) | 136(24.2) | 0.001 |
| 2,000 - 3,990 | 847(56.1) | 523(55.1) | 324(57.8) | |
| 4,000 | 346(22.9) | 245(25.8) | 101(18.0) | |
| **Employment status** | | | | |
| Unemployment | 399(26.1) | 277(28.7) | 122(21.6) | 0.001 |
| Employment | 1,131(73.9) | 689(71.3) | 442(78.4) | |
| **Family history of cancer** | | | | |
| Yes | 526(34.4) | 308(31.9) | 218(38.7) | 0.002 |
| No | 1,004(65.6) | 658(68.1) | 346(61.3) | |
| **Perceived cancer risk** | | | | |
| Low | 726(47.5) | 509(52.7) | 217(38.5) | 0.000 |
| Moderate | 666(43.5) | 389(40.3) | 277(49.1) | |
| High | 138(9.0) | 68(7.0) | 70(12.4) | |
| **Smoking** | | | | |
| Yes | 373(24.4) | 201(20.8) | 172(30.5) | 0.000 |
| No | 1,157(75.6) | 765(79.2) | 392(69.5) | |
| **Drinking** | | | | |
| Yes | 527(34.3) | 262(27.1) | 265(47.0) | 0.000 |
| No | 1,003(65.6) | 704(72.9) | 299(53.0) | |
| **Exercise** | | | | |
| Yes | 677(44.2) | 494(51.1) | 183(32.4) | 0.000 |
| No | 853(55.8) | 472(48.9) | 381(67.6) | |
| **Personality:extraversion** | | | | |
| Low | 516(33.7) | 306(31.7) | 210(37.2) | 0.068 |
| Moderate | 556(36.3) | 367(38.0) | 189(33.5) | |
| High | 458(29.9) | 293(30.3) | 165(29.3) | |
| **Personality:agreeableness** | | | | |
| Low | 517(33.8) | 348(36.0) | 169(30.0) | 0.022 |
| Moderate | 551(36.0) | 326(33.7) | 225(39.9) | |
| High | 462(30.2) | 292(30.2) | 170(30.1) | |

* p values were determined using the chi-square test

**Table 1. Participant Characteristics by Diet Quality. cont.**

| VVariables | Total n(%) | Healthy diet n(%) | Non-health diet n(%) | p* |
|---|---|---|---|---|
| **Personality:conscientiousness** | | | | |
| Low | 623(40.7) | 401(41.5) | 222(39.4) | 0.030 |
| Moderate | 552(36.1) | 326(33.7) | 226(40.1) | |
| High | 355(23.2) | 239(24.7) | 116(20.6) | |
| **Personality:emotional stability** | | | | |
| Low | 576(37.6) | 351(36.3) | 225(36.3) | 0.241 |
| Moderate | 557(36.4) | 352(36.4) | 205(36.3) | |
| High | 397(25.9) | 263(27.2) | 134(23.8) | |
| **Personality:openness to experience** | | | | |
| Low | 919(60.1) | 586(60.7) | 333(59.0) | 0.370 |
| Moderate | 239(15.6) | 156(16.1) | 83(14.7) | |
| High | 372(24.3) | 224(23.2) | 148(26.2) | |
| **Impulsiveness** | | | | |
| Low | 526(34.4) | 344(35.6) | 182(32.3) | 0.286 |
| Moderate | 490(32.0) | 297(30.7) | 193(34.2) | |
| High | 514(33.6) | 325(33.6) | 189(33.5) | |
| **Stress** | | | | |
| Low | 123(8.0) | 92(9.5) | 31(5.5) | 0.000 |
| Moderate | 1,154(75.4) | 751(77.7) | 403(71.5) | |
| High | 253(16.5) | 123(12.7) | 130(23.0) | |
| **Coping strategy:social support seeking** | | | | |
| Low | 649(42.4) | 375(38.8) | 274(48.6) | 0.000 |
| Moderate | 449(29.3) | 292(30.2) | 157(27.8) | |
| High | 432(28.2) | 299(31.0) | 133(23.6) | |
| **Coping strategy:problem solving** | | | | |
| Low | 627(41.0) | 370(38.3) | 257(45.6) | 0.020 |
| Moderate | 458(29.9) | 303(31.4) | 155(27.5) | |
| High | 445(29.1) | 293(30.0) | 152(27.0) | |
| **Coping strategy:avoidance** | | | | |
| Low | 531(34.7) | 319(33.0) | 212(37.6) | 0.193 |
| Moderate | 542(35.4) | 350(36.2) | 192(34.0) | |
| High | 457(29.9) | 297(30.7) | 160(28.4) | |
| **Sense of coherence** | | | | |
| Low | 518(33.9) | 292(30.2) | 226(40.1) | 0.000 |
| Moderate | 514(33.6) | 325(33.6) | 189(33.5) | |
| High | 498(32.5) | 349(36.1) | 149(26.4) | |
| **Self-efficacy** | | | | |
| Low | 634(41.4) | 247(25.6) | 387(68.6) | 0.000 |
| Moderate | 656(42.9) | 513(53.1) | 143(25.4) | |
| High | 240(15.7) | 206(21.3) | 34(6.0) | |
| **Social support** | | | | |
| Low | 479(31.3) | 240(24.8) | 239(42.4) | 0.000 |
| Moderate | 477(31.2) | 323(33.4) | 154(27.3) | |
| High | 574(37.5) | 403(41.7) | 171(30.3) | |

* p values were determined using the chi-square test.

between demographics, health-related characteristics, personality, impulsiveness, stress, coping strategy, SOC, self-efficacy, and social support and self-perception of diet quality. Multivariate logistic regression was subsequently performed, using perceived healthy diet as a dependent variable and all individual characteristics as independent variables. Three groups (i.e., low, moderate and high) were created based on the tertile scores of personality, impulsiveness, coping strategy, SOC, and social support. Variables that were significant (i.e., p < 0.1) upon bivariate analysis were used to determine the multivariate relationships between a set of background characteristics, including personality, stress, coping strategy, SOC, self-efficacy, and social support and self-perception of diet quality. We included all the covariates that were significant upon bivariate analysis to the multivariate logistic regression. Data were analyzed using SPSS 15.0 software.

## Results

Table 1 lists the characteristics of the study population and self-perception of diet quality with regards to each

**Table 2. Multivariate Logistic Regression Analysis, with Self-perception of Diet Qquality as the Dependent Variable.***

| Variables | | OR | 95% CI | P |
|---|---|---|---|---|
| Gender | Male | 1.00 | | |
| | Female | 1.08 | 0.77-1.50 | .647 |
| Age, yr | 30-39 | 1.00 | | |
| | 40-49 | 0.94 | 0.68-1.29 | .708 |
| | 50-59 | 1.52 | 1.05-2.18 | .024 |
| | 60-69 | 2.02 | 1.30-3.15 | .002 |
| Marital status | Uncoupled | 1.00 | | |
| | Coupled | 1.61 | 1.10-2.35 | .014 |
| Monthly family | <2.000 | 1.00 | | |
| income, | 2,000 - 3,990 | 1.14 | 0.81-1.60 | .450 |
| $ (missing = 19) | 4,000 | 1.81 | 1.20-2.72 | .005 |
| Employment | Unemployment | 1.00 | | |
| status | Employment | 0.95 | 0.68-1.32 | .770 |
| Family history | Yes | 0.88 | 0.68-1.16 | .385 |
| of cancer | No | 1.00 | | |
| Perceived cancer | Low | 1.00 | | |
| risk | Moderate | 0.71 | 0.54-0.93 | .013 |
| | High | 0.58 | 0.37-0.92 | .020 |
| Smoking | Yes | 1.18 | 0.84-1.66 | .329 |
| | No | 1.00 | | |
| Drinking | Yes | 0.48 | 0.36-0.63 | .000 |
| | No | 1.00 | | |
| Exercise | Yes | 1.66 | 1.28-2.15 | .000 |
| | No | 1.00 | | |
| Personality | Low | 1.00 | | |
| :extraversion | Moderate | 1.22 | 0.90-1.65 | .188 |
| | High | 0.84 | 0.61-1.16 | .297 |
| Personality | Low | 1.00 | | |
| :agreeableness | Moderate | 0.70 | 0.52-0.95 | .023 |
| | High | 0.66 | 0.47-0.94 | .021 |
| Personality | Low | 1.00 | | |
| :conscientiousness | Moderate | 0.60 | 0.52-0.95 | .001 |
| | High | 0.74 | 0.47-0.94 | .128 |
| Stress | Low | 1.00 | | |
| | Moderate | 0.79 | 0.47-1.33 | .377 |
| | High | 0.46 | 0.24-0.85 | .014 |
| Coping strategy | Low | 1.00 | | |
| :social support | Moderate | 1.21 | 0.89-1.65 | .218 |
| seeking | High | 1.11 | 0.78-1.56 | .548 |
| Coping strategy | Low | 1.00 | | |
| :problem solving | Moderate | 1.20 | 0.88-1.65 | .245 |
| | High | 1.07 | 0.78-1.56 | .691 |
| Sense of coherence | Low | 1.00 | | |
| | Moderate | 1.15 | 0.84-1.57 | .369 |
| | High | 1.45 | 1.02-2.07 | .037 |
| Self-efficacy | | | | |
| | Low | 1.00 | | |
| | Moderate | 5.12 | 3.91-6.71 | .000 |
| | High | 6.70 | 4.36-10.30 | .000 |
| Social support | | | | |
| | Low | 1.00 | | |
| | Moderate | 1.82 | 1.33-2.50 | .000 |
| | High | 1.39 | 1.01-1.92 | .044 |

OR, odds ratio; CI, confidence interval; * Data were adjusted for age, gender, marital status, income, employment status, family history of cancer, perceived cancer risk, smoking, drinking, exercise, personality, stress, coping strategy, sense of coherence, self-efficacy, and social support.

variable. The mean age was 46.7 years (SD, 10.3 years; range, 30 to 69 years; median, 46.0 years), 86.7% had a partner and 73.9% were employed. Nearly one third of the participants had a university-level education, whereas 20.4% of the study population had not completed high school. About one half of the participants perceived their chance of developing cancer as lower than that of their peers. The prevalence rates of smoking, drinking, self-perception of diet quality, and exercise were 24.4%, 34.3%, 63.1%, and 44.2%, respectively. Self-perception of diet quality differed significantly with regard to gender, age, marital status, income, employment status, family history of cancer, perceived cancer risk, smoking, drinking, exercise, personality traits, stress, coping strategy, SOC, self-efficacy, and social support.

Table 2 lists the odds ratios (OR) and 95% confidence intervals (CI) for the multivariate logistic regression model. After adjusting for all covariates, age, living with a partner, income, exercise, SOC, self-efficacy, and social support were positively associated with perceived healthy diet. Respondents aged between 50 and 59 years and 60 years or older were more likely to perceive that they consumed a healthy diet (OR: 1.52, 95% CI: 1.05 – 2.18, P: 0.024; OR: 2.02, 95% CI: 1.30 – 3.15, P: 0.002) than were respondents younger than 50 years. Respondents who lived with a partner were more likely to perceive that they consumed a healthy diet (OR: 1.61, 95% CI: 1.10 – 2.35, P: 0.014) than those who did not live with a partner. Respondents earning a monthly family income greater than $4,000 were more likely to perceive that they consumed a healthy diet (OR: 1.81, 95% CI: 1.20 – 2.72, P: 0.005) than respondents who earned less than $2,000 per month. Exercise was significantly associated with a perceived healthy diet (OR: 1.66, 95% CI: 1.28 – 2.15, P < 0.001). Respondents with high SOC were more likely to perceive that they consumed a healthy diet (OR: 1.45, 95% CI: 1.02 – 2.07, P: 0.037) than those with low SOC. Respondents with at least a moderate level of self-efficacy were more likely to perceive that they consumed a healthy diet (OR: 5.12, 95% CI: 3.91 – 6.71, P < 0.001; OR: 6.70, 95% CI: 4.36 – 10.30, P < 0.001) than those with low self-efficacy. Respondents who received moderate or high social support were more likely to perceive that they consumed a healthy diet (OR: 1.82, 95% CI: 1.33-2.50, P < 0.001; OR: 1.39, 95% CI: 1.01-1.92, P < 0.001) than those with less perceived support.

Conversely, after adjusting for all covariates, perceived cancer risk, drinking, agreeableness, conscientiousness, and stress were negatively associated with perceived healthy diet. Respondents who perceived that their chance of developing cancer was moderate or high were less likely to perceive that they consumed a healthy diet (OR: 0.71, 95% CI: 0.54 – 0.93, P: 0.013; OR: 0.58, 95% CI: 0.37 – 0.92, P: 0.020) than those who perceived their risk to be low. Drinking behavior was significantly associated with a perceived unhealthy diet (OR: 0.48, 95% CI: 0.36 – 0.63, P < 0.001). Respondents with

personality traits of moderate or high agreeableness were less likely than other respondents were to perceive that they consumed a healthy diet (OR: 0.70, 95% CI: 0.52 – 0.95, P: 0.023; OR: 0.66, 95% CI: 0.47 – 0.94, P: 0.021). Respondents who perceived their conscientiousness level to be moderate were less likely than other respondents were to perceive that they consumed a healthy diet (OR: 0.60, 95% CI: 0.45 – 0.82, P: 0.001). Respondents who experienced high levels of stress were less likely than other respondents were to perceive that they consumed a healthy diet (OR: 0.46, 95% CI: 0.24 – 0.85, P: 0.014).

## Discussion

Our findings reveal significant associations between psychosocial factors and self-perception of diet quality. Agreeableness, conscientiousness, and stress level were negatively associated with perceived healthy diet. Higher SOC, self-efficacy, and social support were predictive of a perceived healthy diet. Extraversion and coping strategy were not related to diet.

The proportion of respondents in our study population who reported that they consumed a diverse and balanced diet with sufficient amounts of fruits and vegetables was 63.1%. This finding is notably higher than the objective proportion that is 25.7% of Koreans (Ministry for Health and Welfare & Center for Disease Control and Prevention, 2008), which is the proportion of people who actually eat more than 400 g of fruits and non-salted vegetables per day as recommended by World Cancer Research Fund (WCRF&AICR, 2007). Although only one in four people actually consume a healthy diet, more than 60% of the respondents had a relatively optimistic perception of their diet. Individuals believe that they do not engage in risky behaviors as frequently as do other individuals, and likewise believe that they perform self-protecting behaviors more often than others (Weinstein, 1984). Such misperceptions can undermine health promotion messages that advocate for behavioral changes, as individuals believe that these messages are aimed at others (Miles et al., 2003). Several studies have found that individuals who underestimate their risk of developing cancer are less likely than others to participate in cancer screening programs (Clemow et al., 2000; Palmer et al., 2007). For this reason, public health interventions should strive to increase awareness of the diet by providing feedback and publicizing the risks of an unhealthy diet.

We observed differences in perceived dietary quality according to demographic factors. Self-perception of diet quality was affected by age, marital status, and income. Older respondents were more likely than younger respondents to perceive their diet as healthy, consistent with previous studies (Girois et al., 2001; Beydoun et al., 2008). Respondents who lived with their partner were more likely to perceive that they consumed a healthy diet. This is probably because couples are more likely to receive support from each other. Respondents with a higher income tended to perceive that they consumed a healthy diet, consistent with previous findings (Beydoun et al., 2008; Kwon et al., 2009). This result may reflect the fact that members of lower socio-economic classes have limited access to healthy foods. Previous research has suggested that there is less emphasis on health-promoting lifestyles and habits among workers of lower occupational status than among their white-collar counterparts (Sorensen et al., 2002).

The subjective perception of the risk of contracting a health condition usually increases the practice of health behaviors (Kwak et al., 2009); however, we found that the perceived risk of cancer was negatively associated with self-perception of diet quality. Previous studies have found that although the perceived risk of gastric cancer is high, few people adopt healthy behaviors when the association between health behavior-related risk factors and health behavior is not well recognized (Kwak et al., 2009). Individuals who believe strongly in the relationship between diet and cancer are more likely than others to engage in healthy dietary practices and to possess a high knowledge of nutrition, which predicts the transition to a healthy diet (Glanz et al., 1993; Patterson et al., 1996). However, only 13.8% of the Korean population was aware of the Dietary Guidelines for Koreans in 2008, and the participation rate of nutrition education and counseling was only 5% (Ministry for Health and Welfare & Center for Disease Control and Prevention, 2008). Thus, the negative relationship between perceived cancer risk and self-perception of diet quality seems linked to under-recognition of the association between health behavior-related risk factors and health behavior.

With regards to health behavior-related risk factors, perceived healthy dietary habits were less common among respondents who consumed excessive amounts of alcohol or exercised less frequently, consistent with previous studies (Alterkruse et al., 1995; Ruidavets et al., 2004; Breslow et al., 2006; Bogh-Sorensen et al., 2009). It seems that people who engage in one risky behavior are more likely to engage in another unhealthy behavior. In keeping with this observation, Prochaska (2008) demonstrated that simultaneous and sequential interventions can prove effective. However, our results indicate that smoking is not associated with perceived diet healthiness, contrary to previous findings. Some studies have reported that smokers have a higher intake of non-vegetarian food items and a lower intake of fruits (Marangon et al., 1998; Jain et al., 2009). This discrepancy may reflect the fact that smoking is more dependent on legal and social factors rather than voluntary and private control, contrary to other health-related behaviors. The problem of smoking and its effects have been approached using population-based public health strategies utilizing laws, regulations, taxes, and policies. Thus, individuals who even engage in poor dietary habits can be more likely to be non-smokers because smoking is also affected by external factors.

We noted a statistically significant inverse association between agreeableness and conscientiousness and a perceived healthy diet. One study reported that "type-D" was associated with health behavior. Specifically, "type-D" individuals performed fewer health-related behaviors and were significantly less likely to eat sensibly compared with individuals not classified as "type-D."(Williams et al., 2008). However, few previous studies have investigated the associations between personality and healthy diet. In our study, individuals who are pleasant and accommodating in social situations, as well as individuals who are painstaking and careful, appear less likely than others to perceive that they consumed a healthy diet. This is probably because individuals who are agreeable or conscientious may tend to have a strict standard in evaluating themselves, thus they perceived they consumed less healthy diet.

Stress not only influences health via direct psychophysiological processes, but also by modifying risk via changes in health behaviors (Steptoe, 1991). We found that perceived healthy dietary habits decreased as perceived stress increased, consistent with previous findings (Oliver et al., 1999). Stress appears to alter overall food intake and contribute to either undereating or overeating, which may be influenced by stressor severity (Grunberg et al., 1992; Oliver et al., 1999). Chronic life stress seems associated with a greater preference for energy-dense foods, which contribute to obesity (Walcott-McQuigg, 1995; Laitinen et al., 2002; Ng et al., 2003). Therefore, stress management programs can help maintain a healthy diet.

Our findings revealed that SOC played a significant role in the perceived healthy diet. Respondents with a high SOC were more likely than others to perceive that they consumed a healthy diet. Previous studies have found that SOC explains how some people manage to remain healthy under stressful conditions (Antonovsky, 1987). Stressful situations contribute to abnormal diet patterns. Fortunately, SOC correlates positively with low stress and ability to cope with stress (Gilbar, 1998; Gustavsson-Lilius, 2007). Therefore, it is reasonable to argue that people who consume healthy diets are better prepared than others to resist the negative effects of stress. Previous studies have noted an association between SOC and other health behaviors. In particular, higher SOC is linked with better oral health and oral health behaviors (Savolainen et al., 2005), and is associated with never-smoking status (Surtees et al., 2003; Igna et al., 2008) and frequent physical activity (Kuuppelomaki et al., 2003). On the other hand, several studies have failed to detect an association between the strength of SOC and health behaviors (Kuuppelomaki et al., 2003; Runeson et al., 2003). Earlier studies did not report any connection between SOC and diet; thus, further research is needed to confirm this association.

Self-efficacy was the most predictable factor linked to a perceived healthy diet. Those who reported more than moderate self-efficacy had five to six times greater odds of self-perception of diet quality than did those with low self-efficacy. Respondents who believed in their ability to prepare a diverse, balanced diet with sufficient fruits and vegetables had a strong tendency to perceive that they consumed a healthy diet. Self-efficacy is generally regarded as an important influence on behavior (Roach et al., 2003; Riebe et al., 2005; Anderson et al., 2007).

As the level of perceived social support increased, respondents were more likely to perceive that they consumed a healthy diet. Several studies have examined the association between social support and diet. One qualitative study revealed that significant persons were primary sources of emotional, instrumental, and diet-related informational support among pregnant women (Thornton et al., 2006). Another study suggested that social support moderates the influence of stress on eating behavior. Pollard (1995) reported that participants who experience stress and have a low level of social support showed significant increases in total energy and fat intake. Through the interpersonal exchanges within a social network, individuals are influenced and supported in preventive health behaviors. Social support usually consists of both structural and functional aspects. Structural support refers to the existence of family/friends and other social networks within an individual's environment. We found no difference in self-perception of diet quality with regards to the source of social support, whereas previous studies have found that some sources of support are more likely than others to influence specific health behaviors (Vaananen et al., 2008). Social support also refers to the functional content of relationships, which can be categorized into four types: emotional, instrumental, informational, and appraisal support (House, 1981). Smoking behavior is more greatly influenced by a specific type of support (Yun et al., 2010); however, few studies have investigated the relationship between specific types of support and healthy diet and we did not identify a particular type of social support that was more influential. It is necessary to determine which sources provide certain types of support, because this can guide efforts to promote healthy diet based on the receiver's educational needs. In fact, health behavior intervention in the form of social support groups has proven effective (Carlson et al., 2002; Park et al., 2004).

Our study has several limitations. First, it is difficult to demonstrate causality based on the cross-sectional and self-reported data in this study. Second, the outcomes measured in this study were limited to the perception of a healthy diet. Actual food intake was not measured. The measure of diet variables and self-efficacy were limited to a single question regarding the respondent's intake of a diverse, balanced diet with sufficient amounts of fruits and vegetables. Future studies might assess actual frequency and volume of the consumption of fruits and vegetables. Third, self-efficacy and perceived diet quality were very similar, thus, this might explain the strong association between measures. Despite these limitations, we have identified a comprehensive set of psychosocial

factors that are associated with the self-perception of diet quality by the Korean public in a population sample. This cross-sectional study was conducted using a multiple-stratified random sampling methods based on the Korea Census of 2007 to obtain a nationally representative sample. These results will lay the foundation for future efforts aimed at minimizing the barriers faced by the Korean public in accessing healthy diet. An assessment of the factors that contribute to dietary intake could improve educational programs and contribute to the design of effective public health interventions.

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