

# An Alternative Way to Individualized Medicine: Psychological and Physical Traits of *Sasang* Typology

HAN CHAE, K.M.D., Ph.D.,<sup>1,3</sup> IN KYOON LYOO, M.D., Ph.D.,<sup>2,3</sup> SOO JIN LEE, M.S.,<sup>2</sup>  
SONHAE CHO, K.M.D.,<sup>4</sup> Ph.D., HYUNSU BAE, K.M.D., Ph.D.,<sup>5</sup>  
MOOCHANG HONG, K.M.D., Ph.D.,<sup>5</sup> and MINKYU SHIN, K.M.D., Ph.D.<sup>5</sup>

## ABSTRACT

**Background:** Disease susceptibility and drug response of individuals are presumed to be different depending on their personality traits. The *Sasang* typology, a traditional Korean medical typology, explains the individual differences of vulnerability to pathology and proposes guidelines for the safe and effective use of medical herbs depending on individual traits.

**Objective:** The purpose of the present study was to evaluate psychologic and physical characteristics of *Sasang* types from the perspective of personality theory.

**Design:** After determining the *Sasang* type of 79 college students based on the Questionnaire for the *Sasang* Constitution Classification, the psychologic and physical traits of each type were analyzed by the Meyers-Briggs Type Indicator (MBTI) and Bioelectrical Impedance Analysis, respectively.

**Results:** Each of the *Sasang* types showed significantly different profiles based on the MBTI scores (generalized estimation equation, coefficient = 11.88,  $z = 2.13$ ,  $p = 0.033$ ) and could be distinctively classified based on their MBTI scores (discriminant analysis Wilks'  $\lambda = 0.611$ ,  $df = 8$ ,  $\chi^2 = 36.7$ ,  $p < 0.001$ ). Subjects with the *So-Eum* type (Introversion and Judging) and the *So-Yang* type (Extroversion and Perceiving) showed contrasting psychologic features. However, they had similar anthropometric characteristics. Subjects with *Tae-Eum* type had relatively higher body fat mass.

**Conclusion:** Current results demonstrated distinctive personality traits associated with *Sasang* types using reproducible psychometric and anthropometric instruments. With further study, the *Sasang* typology could serve as a scientific tool for individualized and integrative medicine.

## INTRODUCTION

Personality trait is the characteristic style of an individual's behavioral tendency, often incorporating temperament, pattern of behavior, and the accompanying emotional expres-

sion (Loehlin, 1992). Also, it is thought to be closely associated with specific body shape and features (Kretschmer, 1921). Because disease vulnerability and drug reaction are presumed to be potentially different according to such traits, a number of studies have been conducted

<sup>1</sup>McLean Hospital Mailman Research Center, Belmont MA.

<sup>2</sup>McLean Hospital Brain Imaging Center, Belmont, MA.

<sup>3</sup>Department of Psychiatry, Harvard Medical School, Boston, MA.

<sup>4</sup>Department of Oriental Pharmaceutical Science, Kyung Hee University College of Pharmacy, Seoul, South Korea.

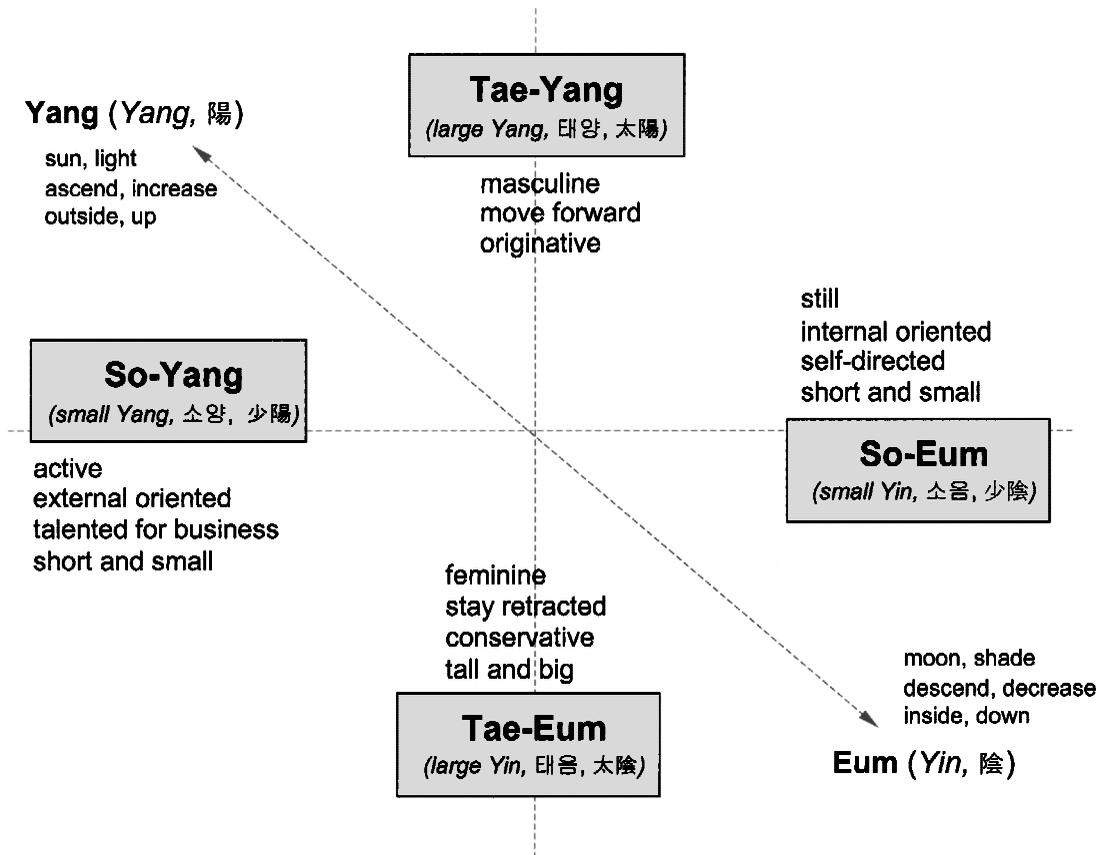
<sup>5</sup>Department of Physiology, Kyung Hee University College of Oriental Medicine, Seoul, South Korea.

to examine the relationship between personality traits and susceptibility to pathology or drug response, with the ultimate goal of achieving a more personalized medicine (Ebstein et al., 2000; Kaasinen et al., 2001; Nowotny et al., 2001; Paris, 2000).

*Sasang* typology, however, offers temperament-based guidelines for the safe and effective use of herbal medicine, even those with significant adverse effects such as *ma huang* (*Ephedra sinica*) (Haller and Benowitz, 2000) and aconite (*Aconitum carmichaeli*) (Tai et al., 1993). It also explains individual differences in behavioral patterns and tendencies and physical characteristics based on particular biopsychological traits (Fig. 1). Despite its potential value in constructing personalized and integrative medicine, traits of *Sasang* types have not been studied in a quantitative and scientific manner, barring their development and propagation to other countries and cultures. The

purpose of the present study was to examine empirically the psychologic and anthropometric characteristics associated with the *Sasang* types from a personality-oriented perspective.

*Sasang* typology was systematically theorized in the book *Dong-Yi-Soo-Se-Bo-Won* (The Principle of Life Preservation in Oriental Medicine) (Lee, 1894) by Jae Ma Lee in the field of traditional Korean medicine. *Sasang* typology also utilizes the herbs found in Traditional Chinese Medicine but is different from Traditional Chinese Medicine in the following aspects. First, Traditional Chinese Medicine is based on Taoism and explains the universe with *yin-yang* theory and the five-phases idea (Maciocia, 1989). In contrast, the *Sasang* typology is based on the combination of Neo-Confucianism and the medical tradition of Korea, and describes nature as quaternary (Yeo, 1998). Traditional Chinese Medicine places importance on the harmony between humanity and nature,



**FIG. 1.** A schematic diagram of *Sasang* types from a biopsychologic perspective. The psychologic features of *Sasang* types are explained as a pair of *Tae-Yang* (large Yang) type and *Tae-Eum* (large Yin) type, and *So-Yang* (small Yang) type and *So-Eum* (small Yin) type. Korean and Chinese letters are also used.

whereas *Sasang* typology emphasizes the harmony in social life and developing one's character (Lee, 1894, 1996). Therefore, *Sasang* typology has a sociologic as well as a biologic facet.

In *Sasang* typology, human beings are classified into four *Sasang* types; *Tae-Yang*, *So-Yang*, *Tae-Eum*, and *So-Eum*. Although these names were borrowed from *I Ching* (The I Ching or Book of Changes, 1967), different meanings have been incorporated in Korean traditional medicine (Lee, 1996). The *Sasang* type of a person is presumed to be made by four natures and represents different temperaments, body shapes, and other general character features (Table 1) (Lee, 1894). The general characteristic features of *Sasang* types are as follows. The *Yang* (*yang*) types (*Tae-Yang* and *So-Yang*) are extroverted and the *Eum* (*yin*) types (*Tae-Eum* and *So-Eum*) are introverted. *Tae-Yang* type refers to a creative and visionary person who is gifted for starting social relationships but not in sustaining them. *So-Yang* type is a sharp and clean-looking person who is extroverted and interested in the outside world. The *Tae-Eum* type is a conservative and cautious person who has a talent for sustaining social relationships.

The *So-Eum* type is an inactive, prudent, narrow-minded, resolute, and self-directed person who is in his or her own world. The body shape of *Tae-Eum* type is larger than that of the *So-Eum* type, and the body shapes of *So-Eum* and *So-Yang* types are similar (Lee, 1894, 1996). Basic assumptions are that these characteristics make people vulnerable to certain pathologic factors and to manifest different symptom profiles even within the same disease. Consequently, even for the treatment of a same disease, the *Sasang* type-specific medication and lifestyle are recommended (Lee, 1894, 1996).

We hypothesized that the *Sasang* type could be distinctively and reliably classified by a modern personality theory. Based on the character and physical features represented by the *Sasang* types, it was hypothesized that *Yang* (*yang*) types would be more extroverted than the *Eum* (*yin*) types and that the anthropometric values (body fat mass, waist-hip ratio, and body mass index) of *Tae-Eum* type would be larger than that of *So*-types (*So-Eum* and *So-Yang*). After dividing a college student sample into groups based on their *Sasang* type as determined by the Questionnaire for the Sasang Constitution Classification (QSCC), their typology

TABLE 1. GENERAL FEATURES OF THE FOUR SASANG TYPES (TRADITIONAL KOREAN MEDICAL TYPOLOGY)

	<i>Tae-Yang</i> <sup>a</sup>	<i>So-Yang</i> <sup>b</sup>	<i>Tae-Eum</i> <sup>c</sup>	<i>So-Eum</i> <sup>d</sup>
Nature	Sorrow	Anger	Gladness	Enjoyment
Developed organ	Lung	Spleen	Liver	Kidney
Undeveloped organ	Liver	Kidney	Lung	Spleen
Character	Creative Positive Progressive Charismatic Heroic Rash mind	Unstable Easily get bored Sacrificing Righteous Easily acceptable Hot tempered Anxious mind	Gentle Commercial Endurable Humorous Look foolish Coward Fearful mind	Neat, mild Negative Intelligent Organized Selfish Jealous Persistent Nervous mind
Body shape	Developed nape of the neck, slender waist	Developed chest, small hips	Thick waist, weak nape of the neck	Developed hip, weak chest
Healthy sign	Urination	Bowel movement	Perspiration	Digestion
Unhealthy sign	Bubbles in mouth, emesis	Constipation	No perspiration	Indigestion

<sup>a</sup>*Tae-Yang*; Large-Sun, the strength of *Yang* is its peak.

<sup>b</sup>*So-Yang*; Small-Sun, the strength of *Yang* is currently small and at increasing stage.

<sup>c</sup>*Tae-Eum*; Full-Moon, it represents the strongest strength of *Yin* (Eum).

<sup>d</sup>*So-Eum*; Decrescent-Moon, it symbolizes the weakest strength of *Yin* (Eum).

logical traits from psychologic and physical perspectives were assessed using the Myers-Briggs Type Indicator (MBTI) and the Bioelectrical Impedance Analysis (BIA), respectively. By characterizing traits of *Sasang* types, this study could suggest an alternative tool for the explanation of individual differences in medicine.

## MATERIALS AND METHODS

### *Subjects*

Study subjects were 102 students between the ages of 19 and 43 (89 males, 13 females; ages  $25.4 \pm 5.2$ ) enrolled in the oriental medical physiology class at the College of Oriental Medicine, Kyung Hee University, Seoul, Korea in 2000. The staff at the Department of Physiology, Oriental Medical College, Kyung Hee University supervised the QSCC and BIA tests, and a certified clinical psychologist (S.J.L.) supervised the administration of the MBTI test.

Because the formal Institutional Review Board (IRB) was not established at the time of this study, we assessed the appropriateness of the protocol by consulting with the senior staff of the college. All participants gave oral consents for the full assessments; 12 students did not complete the QSCC, 3 did not complete the MBTI, and 12 did not complete the BIA. Because 23 students were excluded, data from 79 students (69 males, 10 females; ages  $25.1 \pm 4.8$ ; range, 19–42) were analyzed.

### *Measures*

**QSCC.** QSCC is a *Sasang* typology-based inventory, which was developed by the Department of Sasang Medicine at Kyung Hee Medical Center (Seoul, Korea) in 1993 (Kim et al., 1993) and revised in 1996 (Kim et al., 1996), and has been used in clinical studies. The revised edition is based on 1366 subjects (668 males, 678 females). Ages ranged from 10 to 60 years and 68% of subjects had educational levels over 12 years. It has been also validated using 265 subjects from the Department of Sasang Constitutional Medicine or Oriental Medicine & Western Medicine Cooperative Health Examination Center, Kyung Hee University Medical Center

(Kim et al., 1996). The QSCC is composed of 121 forced-choice items. The internal consistency (Cronbachs  $\alpha$ ) of this inventory is as follows: *Tae-Yang* type is 0.57, *So-Yang* type is 0.57, *Tae-Eum* type is 0.59, and *So-Eum* type is 0.63 (Kim et al., 1996).

The *Sasang* type of an individual was determined following two procedures. First, the raw scores for *Sasang* types were acquired with the QSCC. After standardizing the raw scores based on their age and gender-specific norms, these scores were computed into discriminants to differentiate *Sasang* type of individuals (Kim et al., 1996). A paper-and-pencil self-report form of the QSCC was used, and *Sasang* type was determined using a PC-based software (Win QSCC II 99 version; Ssord Medicom & Ssord OMS, Seoul, Korea).

**MBTI Form GS.** The MBTI is a paper-and-pencil self-report form composed of 95 forced-choice items first developed by Myers and Briggs and translated into Korean by Sim (1990). It is a psychometric instrument designed to assess normal personality traits (Kim et al., 1995). This inventory has been chosen because it is geared toward assessing differences that result from the way people perceive information and how they prefer to use that information (Myers and McCauley, 1985). Individuals fall into four dichotomous personality dimensions based on their scores. Thus, there are eight categorical personality types: Introversion/Extroversion, Sensing/Intuition, Thinking/Feeling, and Judging/Perceiving. With its proven validity and reliability, the MBTI has been widely used to examine personality profiles in Korea (Kim et al., 1995). The MBTI individual categorical dimensions (i.e., Extroversion/Introversion) were also presented as continuous preference scores (i.e., below 100 is Extroversion and above 100 is Introversion) (Myers and McCauley, 1985). The preference scores (MBTI scores, hereafter) of the four dichotomies were used for the analysis in the present study.

**BIA.** The BIA is an electrical method for measuring anthropometric data in epidemic or clinical studies (Neves and Souza, 2000; Toda et al., 2000). It is simple and noninvasive and pro-

vides reliable results (Bracco et al., 1996; Stewart et al., 1993) for estimating total body water and lean body mass (LBM) (Cha et al., 1995). Assuming that LBM is hydrated in a constant and uniform manner, the BIA can be used to estimate body fat mass (BFM), the nonhydrated portion of the body, by subtracting LBM from the weight (Cha et al., 1995; Toda et al., 2000).

The body composition measurements and the waist-hip ratio (WHR) were obtained by segmental bioelectrical impedance analysis using eight tactile electrodes. Subjects were asked to stand barefoot on a platform with electrodes attached to their hands and feet. Hand electrodes consisted of a thumb pipe and palm cylinder electrodes, and foot electrodes consisted of frontal and rear sole plate electrodes. These electrodes were used to measure the impedance of the trunk and each extremity separately by regulating impedance meter via electronic on-off switches (Toda et al., 2000). Weight was measured to the nearest 0.1 kg and height to the nearest 1 cm. The body mass index (BMI), an index of general obesity, was calculated as weight in kilograms divided by the square of height in meters.

*Statistical analysis*

Demographic differences between *Sasang* types (*So-Yang*, *Tae-Eum*, and *So-Eum*) were tested using independent *t* tests for continuous variables (age, education) and Fisher’s exact tests for categorical variable (gender). The cross-sectional time-series regression analysis was used to evaluate the difference in MBTI score patterns of *Sasang* types (*So-Yang*, *Tae-Eum*, and *So-Eum*). The MBTI scores of four dichotomies (Extroversion/Introversion, Sensing/Intuition, Thinking/Feeling, and Judging/Perceiving) were analyzed as panel data, which

means repeated measures within subjects. Also generalized estimation equation (GEE) modeling was used, which allows robust estimation of standard errors. Interactions were checked for significance in models in which there were multiple explanatory factors. The discriminant analysis was conducted to measure how well the *Sasang* types are classified based on individual MBTI scores.

The MBTI scores of each *Sasang* type were analyzed to evaluate the differences between *Sasang* types in a linear regression model. The *Sasang* type was transformed as dummy variables to compare differences in MBTI scores among groups. The MBTI score was shown as mean ± standard deviation.

Differences in anthropometric variables such as height, body weight, LBM, BFM, BMI, and WHR between *Sasang* types were analyzed using multiple regression analysis. *Sasang* type was transformed as dummy variables and included in the model to compare the differences between groups. Age and gender were used as independent variables.

These statistical analyses were done using SPSS 10.0 (SPSS Inc., Chicago, IL) except cross-sectional time-series regression analysis, which was done with Sat 6.0 (Stata Corporation, College Station, TX). Statistical significances were set to be two-tailed at the 0.05 level.

**RESULTS**

Because the prevalence of the *Tae-Yang* type was extremely low (0.03%–0.1%) (Lee, 1894, 1996), three *Sasang* types were successfully identified based on QSCC in the current study (Table 2). There were no significant differences among groups with *Sasang* types in age, gender, or education.

TABLE 2. DEMOGRAPHIC CHARACTERISTICS ACROSS SASANG TYPES

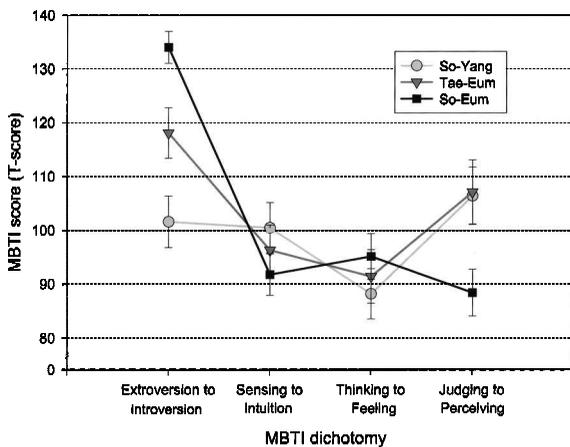
<i>Demographic variable<sup>a</sup></i>	<i>So-Yang</i> (n = 25)	<i>Tae-Eum</i> (n = 23)	<i>So-Eum</i> (n = 31)
Age	25.5 (4.2)	24.1 (3.8)	25.5 (6.0)
Gender (Male/Female)	20/5 (80%/20%)	22/1 (96%/4%)	27/4 (87%/13%)
Education	15.3 (1.1)	15.3 (1.2)	15.9 (1.9)

<sup>a</sup>Results are reported as means (standard deviations) or as numbers (%).

No significant differences in prevalence of age, gender, and education between types.

### MBTI profile

Figure 2 shows MBTI score profiles across the *Sasang* types. The MBTI score patterns of the *So-Yang*, *Tae-Eum*, and *So-Eum* type were significantly different (GEE, coefficient  $\pm 11.88$ ,  $z = 2.13$ ,  $p = 0.033$ ). *Sasang* types of an individual subject were successfully classified with canonical discriminant functions based on their MBTI scores (discriminant analysis Wilks'  $\lambda = 0.611$ ,  $df = 8$ ,  $\chi^2 = 36.7$ ,  $p < 0.001$ ). In the MBTI Extroversion/Introversion dichotomy, there were significant differences in MBTI scores among the three *Sasang* types. MBTI scores of the *So-Eum* ( $133.9 \pm 16.4$ ), *Tae-Eum* ( $118.0 \pm 22.4$ ), and *So-Yang* ( $101.6 \pm 24.0$ ) type was in a decreasing order. There were significant differences between the *So-Eum* and *Tae-Eum* types (coefficient = 15.86,  $t = 2.77$ ,  $p = 0.007$ ), the *Tae-Eum* and *So-Yang* types (coefficient = 16.48,  $t = 2.74$ ,  $p = 0.008$ ), and the *So-Eum* and *So-Yang* types (coefficient = 32.34,  $t = 5.77$ ,  $p < 0.001$ ) in MBTI scores of Extroversion/Intro-



**FIG. 2.** Myers-Briggs Type Indicator (MBTI) score profile of *Sasang* types (*So-Yang*, *Tae-Eum*, and *So-Eum* types). The MBTI score pattern of the *So-Yang*, *Tae-Eum*, and *So-Eum* types were significantly different (generalized estimation equation, coefficient = 11.88,  $z = 2.13$ ,  $p = 0.033$ ). In the MBTI Extroversion/Introversion dichotomy, there were significant differences among the MBTI scores of the *So-Eum* ( $133.9 \pm 16.4$ ), *Tae-Eum* ( $118.0 \pm 22.4$ ) and *So-Yang* ( $101.6 \pm 24.0$ ) types. In the MBTI Judging/Perceiving dichotomy, the MBTI score of the *So-Eum* type ( $88.4 \pm 24.1$ ) was significantly higher than that of the *Tae-Eum* type ( $107.1 \pm 28.6$ ) and the *So-Yang* type ( $106.4 \pm 26.7$ ). Mean MBTI score of the *So-Yang* type is presented as a circle, the *Tae-Eum* type as a triangle, and the *So-Eum* type as a box. Whisker represents standard errors.

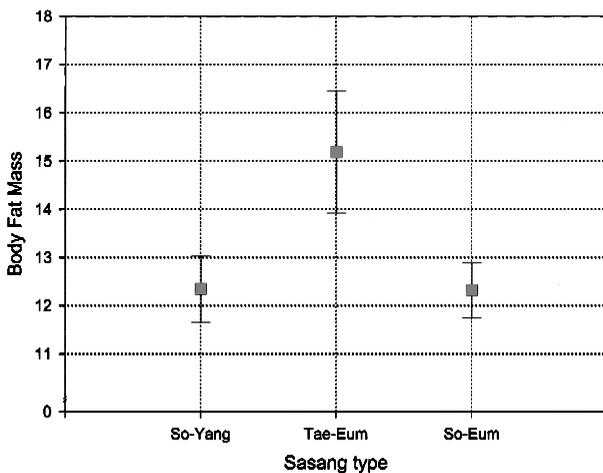
version dichotomy. In the MBTI Judging/Perceiving dichotomy, the MBTI score of subjects with the *So-Eum* ( $88.4 \pm 24.1$ ) type was significantly lower than that of subjects with the *So-Yang* ( $106.4 \pm 26.7$ ) and *Tae-Eum* ( $107.1 \pm 28.6$ ) types (coefficient = 17.94,  $t = 2.54$ ,  $p = 0.013$ ; coefficient = 18.67,  $t = 2.58$ ,  $p = 0.012$ , respectively). There were no significant differences between subjects with different *Sasang* types in MBTI Sensing/Intuition and Thinking/Feeling dichotomies.

### Anthropometric profile

There were significant differences in body weight between *Sasang* types ( $R^2 = 0.40$ ,  $df = 4, 74$ ,  $F = 12.38$ ,  $p < 0.001$ ). The *Tae-Eum* ( $72.0 \pm 12.6$ ) type had greater body weight than *So-Eum* ( $63.6 \pm 7.9$ ) type (coefficient =  $-7.41$ ,  $t = -3.40$ ,  $p = 0.001$ ) and *So-Yang* ( $64.0 \pm 6.8$ ) type (coefficient =  $-6.06$ ,  $t = -2.61$ ,  $p = 0.011$ ). There were no significant differences between *Sasang* types in height.

There were significant differences in LBM and BFM between *Sasang* types ( $R^2 = 0.60$ ,  $df = 4, 74$ ,  $F = 27.36$ ,  $p < 0.001$ ;  $R^2 = 0.14$ ,  $df = 4, 74$ ,  $F = 3.03$ ,  $p = 0.023$ , respectively). The *Tae-Eum* ( $56.8 \pm 8.1$ ) type had significantly greater LBM than the *So-Eum* ( $51.3 \pm 8.0$ ) type (coefficient =  $-0.26$ ,  $t = -2.86$ ,  $p = 0.006$ ). The *Tae-Eum* ( $15.2 \pm 6.1$ ) type had significantly greater BFM than the *So-Yang* ( $12.4 \pm 3.4$ ) and *So-Eum* ( $12.3 \pm 3.2$ ) types (coefficient =  $-3.44$ ,  $t = -2.75$ ,  $p = 0.007$ ; coefficient =  $-3.28$ ,  $t = -2.79$ ,  $p = 0.007$ , respectively) independent of age and gender (Fig. 3). Gender was a significant predictor for weight and LBM (coefficient =  $-15.42$ ,  $t = -5.30$ ,  $p < 0.001$ ; coefficient =  $-0.71$ ,  $t = -9.43$ ,  $p < 0.001$ , respectively).

There were significant differences between *Sasang* types in WHR and BMI ( $R^2 = 0.16$ ,  $df = 4, 74$ ,  $F = 3.50$ ,  $p = 0.011$ ;  $R^2 = 0.22$ ,  $df = 4, 74$ ,  $F = 5.07$ ,  $p = 0.001$ , respectively). There were no significant differences in central obesity (WHR) between *Sasang* types. However, age was a significant predictor of WHR (coefficient = 0.002,  $t = 2.64$ ,  $p = 0.010$ ). The *Tae-Eum* ( $23.6 \pm 3.3$ ) type had significantly greater BMI, which indicates level of general obesity, than the *So-Eum* ( $21.7 \pm 2.0$ ) type (coefficient =  $-1.89$ ,  $t = -2.98$ ,  $p = 0.004$ ). There were no sig-



**FIG. 3.** The body fat mass of each *Sasang* type (*So-Yang*, *Tae-Eum*, and *So-Eum* types). Subjects with *Tae-Eum* ( $15.2 \pm 6.1$ ) type had significantly greater body fat mass than *So-Yang* ( $12.4 \pm 3.4$ ) and *So-Eum* ( $12.3 \pm 3.2$ ) types (coefficient =  $-3.44$ ,  $t = -2.75$ ,  $p = 0.007$ ; coefficient =  $-3.28$ ,  $t = -2.79$ ,  $p = 0.007$ , respectively). Mean body fat mass of *Sasang* types are presented as box and the whisker represents standard errors.

nificant differences in anthropometric data between the *So-Yang* and *So-Eum* types.

## DISCUSSION

The purpose of this study was to evaluate the validity of *Sasang* types, a traditional Korean medical typology, using a psychometric instrument assessing personality and anthropometric indices from a personality-oriented perspective.

Each *Sasang* type was significantly different from one another in their MBTI score profiles (Fig. 2). Furthermore, the results of discriminant analysis indicated that MBTI scores reliably classified individuals into *Sasang* types. There were different MBTI profiles between *Sasang* types for two of the four MBTI dichotomies: Extroversion to Introversion and Judging to Perceiving dichotomies. The *So-Yang* type was more extroverted than the *Tae-Eum* type, who in turn was more extroverted than the *So-Eum* type. The *So-Eum* type was found to be more judging than both the *So-Yang* and *Tae-Eum* types.

The *So-Eum* type (Introversion and Judging) and the *So-Yang* type (Extroversion and Per-

ceiving) stand on exactly opposite extremes as described by Lee (Lee, 1894) and this study found they exhibited the same contrast in the Extroversion/Introversion and Judging/Perceiving dichotomies of the MBTI, which determines the dominant function of a person (Myers and McCauley, 1985) (Figs. 1 and 2). Considering that the Extroversion to Introversion and the Judging to Perceiving continuum on the MBTI correlated with the Extroversion scale and the Conscientiousness scale of the NEO-Personality Inventory, respectively (Furnham, 1996; MacDonald et al., 1994), and that a high score on the Extroversion scale and a low score on the Conscientiousness scale of the NEO-Personality Inventory highly correlated with the Novelty Seeking scale of the Tridimensional Personality Questionnaire (TPQ) (Benjamin et al., 1998), the personality construct of Novelty Seeking could show a positive correlation with the *So-Yang* *Sasang* type and a negative correlation with the *So-Eum* *Sasang* type. Future study is needed to lend direct support to this relationship.

There were significant differences in anthropometric indices between the *Tae-Eum* type and the *So*-types (*So-Yang* and *So-Eum*). The *Tae-Eum* type was heavier, had higher BFM, LBM, and BMI, score than the *So-Eum* type and was heavier, had higher BFM than the *So-Yang* type. There was no difference in height and WHR between the groups after adjusting for age and gender. *So-Yang* and *So-Eum* types had similar anthropometric characteristics. However, their psychological traits were found to differ.

Kretschmer (Kretschmer, 1921) categorized temperaments according to the concept of fundamental body types. Leptosomes are cold, unemotional with a slender chest. Pyknics have a fat, rounded, squat body shape with a frank, open, sociable, and active character. Athletic individuals are slow, reflective, and stable with muscular features. Kretschmer's conceptualization was based on a diagnostic framework of psychiatry, and combined personality with psychopathological vulnerability (Maher and Maher, 1994). Sheldon et al. (1940) offered a body-build element based dimensional system of body types with his psychiatric patients. Individuals could be classified along a seven-point Likert scale on three separate body

components: endomorph, mesomorph, and ectomorph, derived from the distinctions of embryonic tissue layers. This somatotype was basically a transformation of body-build elements of roundness, muscularity, and linearity into typology (Maher and Maher, 1994). Recently, the dopamine system, one of the neurotransmitter systems of the brain, has been supposed to potentially underlie the regulation of personality traits and body components (Cloninger, 1987; Dupue and Collins, 1999; Poston et al., 1998). It was observed that the dopamine D2 receptor binding, BMI and personality trait of Harm Avoidance were related with each other (Yasuno et al., 2001).

Considering the paucity of research studies in this area even with the advancements in research methodology (Hafner, 1990), the *Sasang* type is a systemic incarnation of medical typology that is poised to explain the influence of emotionality, behavioral patterns and tendencies, and physical and physiologic characteristics in the treatment of a number of diseases (Table 1). The theory behind the *Sasang* typology encompasses biologic as well as sociologic aspects, integrating the 5000 years of clinical experience in traditional oriental medicine with the sociologic and psychological achievements propagated by Confucianism (Lee, 1894, 1996; Yeo, 1998).

Lee (1894) contended that medication and nursing should be individualized according to one's *Sasang* type (Lee, 1894). Although it may be a challenge to interpret *Sasang* typology in terms of a modern scientific perspective, the *Sasang* type-specific responses to particular herbs have been well documented (Jeong et al., 1995a, 1995b; Lee, 1894; Lim et al., 1999). For example, *ma huang* (*Ephedra sinica*) is used to treat respiratory tract disease with mild bronchospasms (Blumenthal and Goldberg, 1998) and but has a potency of a psychostimulant (Kalix, 1991) and may result in weight loss (Astrup et al., 1992). It has been used as a medicine for the *Tae-Eum* type but not for the *So-Eum* type because the *So-Eum* type easily shows side-effects such as insomnia, motor restlessness and tachycardia, which are not observed in the *Tae-Eum* type (Lee, 1894, 1996). Aconite (*Aconitum carmichaeli*) and ginseng (*Panax ginseng*) is recommended for the *So-Eum* type, but

not for the *So-Yang* type (Lee, 1894, 1996). It was reported that the use of *Tae-Eum* type-specific purgative prescription in treating *So-Yang* type stroke patients resulted in chest congestion, an accumulation of pathogens in the chest (Lim et al., 1999). In medical care, the stroke patients should be cared in *Sasang* type-specific manners (Lee, 1894, 1996; Song, 1996). An absolute bed rest is an essential component of caring for stroke patients of *So-Yang* type, but not for other *Sasang* types (*Tae-Eum* and *So-Eum* types) (Lee, 1894, 1996).

For the explanation of other psychological features of *Sasang* typology, it is recommended to evaluate *Sasang* types using the Temperament and Character Inventory (Cloninger et al., 1993; Sung et al., 2002) and the revised NEO-Personality Inventory (McCrae and Costa, 1997) in the future. Considering the relatively small sample size and predominantly male subjects used in this study, further studies using larger samples and representative populations are needed.

In conclusion, this study demonstrated that the *Sasang* type is not just conceptual but a scientific typology with its own unique psychologic and physical traits, operationally definable and replicable with psychometric instruments and anthropometrics. With further clinical investigations focusing on such aspects as trait-specific medication and susceptibility to pathology, the *Sasang* typology may serve as a framework for mobilizing individualized and integrative medicine by providing a biopsychosocial typology perspective.

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Address reprint requests to:

*Han Chae, K.M.D., Ph.D.*

*MRC 215*

*McLean Hospital*

*115 Mill Street*

*Belmont, MA 02478*

*E-mail: han@chaelab.org*