Original Article

Validation of the Sasang Personality Questionnaire in high school students

Soo Jin Lee[a], Sang Yun Han[b], Yong-Jae Lee[c], You-Sun Ko[d], Nayoung Bae[e], Jinhong Cheon[f], Han Chae[b],*

[a] *Department of Psychotherapy, School of Nursing and Public Health, Kyungil University, Gyungsan, Korea*
[b] *Division of Longevity and Biofunctional Medicine, School of Korean Medicine, Pusan National University, Busan, Korea*
[c] *Department of Sasang Constitutional Medicine, Dongguk University, Seong Nam, Korea*
[d] *Department of Physical Education, Sookmyung Women's University, Seoul, Korea*
[e] *First Division of Clinical Medicine, School of Korean Medicine, Pusan National University, Busan, Korea*
[f] *Second Division of Clinical Medicine, School of Korean Medicine, Pusan National University, Busan, Korea*

ABSTRACT

Background: The Sasang Personality Questionnaire (SPQ) is an objective measure of Yin–Yang temperament of Sasang typology with proven clinical and structural validity; however, it has not been validated in people younger than 20 years. The purpose of this study was to examine the biopsychological structure of the SPQ in high school students.
Methods: A total of 670 Korean high school students (365 boys and 305 girls) completed the SPQ, Junior version of Temperament and Character Inventory (JTCI), and weight and height measures. The correlation between the SPQ and JTCI subscales was investigated, and the differences of these subscales, body mass index, and Pondera Index between the high (30%), middle (40%), and low (30%) SPQ total score groups were examined with analysis of variance. The profile analysis was also performed to compare JTCI subscale profiles of the three SPQ total score groups.
Results: The SPQ total score significantly correlated positively with JTCI novelty seeking ($r = 0.548$ and $r = 0.540$) and negatively with JTCI harm avoidance ($r = -0.393$ and $r = -0.395$) in boys and girls, respectively. The JTCI novelty-seeking score is significantly higher in the high SPQ total score group (24.12 ± 5.27 and 24.15 ± 5.17 for boys and girls, respectively) than in the low SPQ total score group (16.49 ± 5.08 and 17.24 ± 4.83, respectively), and the JTCI harm-avoidance score is significantly higher in the low SPQ total score group (25.34 ± 6.08 and 26.64 ± 5.77 for boys and girls, respectively) than in the high SPQ total score group (19.27 ± 6.62 and 19.23 ± 6.00, respectively). The JTCI subscale profiles for the three SPQ total score groups were significantly different for boys (degrees of freedom = 3.416, $F = 292.16$, $p < 0.001$) and girls (degrees of freedom = 3.4, $F = 230.51$, $p < 0.001$). There were no significant correlations or differences in body mass index and Pondera Index among the SPQ total score groups.

* *Corresponding author.* Division of Longevity and Biofunctional Medicine, School of Korean Medicine, Pusan National University, 30 Jangjeon-dong, Geumjeong-gu, Busan 50610, Korea.
E-mail address: han@chaelab.org (H. Chae).

Conclusion: The results showed that the biopsychological structure of the SPQ in adolescents is robust, similar to that in the adult population. The SPQ might be useful for the application of Sasang typology in pediatrics.

1. Introduction

The Sasang typology is a traditional Korean personalized medicine that divides people into four Sasang types (Tae-Yang, So-Yang, Tae-Eum, and So-Eum), and explains disease susceptibility and clinical response to medicinal herbs and acupuncture from the standpoint of their native pathophysiological basis.[1,2] As for the objective pathophysiological,[3] genetic,[4] and physical[2] characteristics of each Sasang type, there have been many studies on their fundamental mechanisms.[5,6] For example, a previous systematic review on Sasang typology suggested that the individuality of autonomic reactivity could explain the pathophysiological characteristics of the Tae-Eum and So-Eum types,[7,8] and the behavioral activation and behavioral inhibition systems could explain the psychobiological traits of the So-Yang and So-Eum types.[9–11]

The Sasang Personality Questionnaire (SPQ) is a recently developed self-report assessment tool for measuring temperament characteristics from the perspective of Sasang typology.[12] The SPQ consists of 14 items. Higher scores of the SPQ are associated with the So-Yang type and lower scores with the So-Eum type. The three subscale structures of the SPQ, such as SPQ-Behavior (SPQ-B; e.g., passive vs. active), SPQ-Cognition (SPQ-C; e.g., meticulous vs. easy going), and SPQ-Emotionality (SPQ-E; e.g., static vs. dynamic), were found to be robust with path analysis and factor analysis[13] repeatedly, and their acceptable clinical validity for distinguishing between the So-Eum, Tae-Eum, and So-Yang types was also reported.[12,14,15]

Studies have explored the validity of SPQ from different perspectives. Until now, psychological features have been examined with the Temperament and Character Inventory (TCI), NEO Personality Inventory,[12] and Myers–Briggs Type Indicator[16]; physical traits with the Ponderal Index (PI) and body mass index (BMI)[8,14,17]; health status with Short Form-12[18]; and Sasang type-specific clinical symptoms with the Sasang Digestive Function Inventory.[3] The psychobiological structure of SPQ was in accordance with previous clinical studies on Sasang typology.[16] That is, the SPQ total score correlates positively with TCI novelty seeking (NS) score and negatively with TCI harm-avoidance (HA) score, while the SPQ and physical traits, such as BMI or PI, were found to be independent.[8] The high (30%) and low (30%) SPQ score groups, corresponding the So-Yang and So-Eum Sasang types, showed high NS and HA scores, respectively.[12,16]

Although the SPQ has showed its clinical usefulness and adequate validity in adults in the age range of 20–70 years,[17] there has been a lack of validation studies in children or adolescents. Since adolescence is a period of dramatic growth into adulthood with vast biopsychosocial changes, adolescents need proper management and guide for the balanced development of the body and mind, which would be useful for integrative and person-centered approaches in pediatrics. However, there are no proper diagnostic tools for children or adolescents except for the SPQ. In contrast, Questionnaire for Sasang Constitution Classification and its variations,[19–21] Phonetic System for Sasang Constitution,[22] Sasang Constitution Questionnaire,[23] Sasang Constitutional Analytic Tool,[24] and other tools were developed and validated only for adults, which might cause limitations of clinical use in pediatrics.[25]

Therefore, the aim of the current study was to examine the psychobiological structure of the SPQ in Korean high school students with the Junior version of TCI (JTCI), BMI, and PI, which have been investigated in adults.[12] That is, the SPQ would correlate positively with JTCI NS and negatively with JTCI HA, and not correlate with physical characteristics of BMI and PI. The high SPQ score group would have higher JTCI NS and lower JTCI HA scores than the low SPQ score group, and the low SPQ score group would have higher JTCI HA and lower JTCI NS[26] scores than the high SPQ score group. This study would provide a foundation for the utilization of the SPQ as an objective clinical tool for screening and measuring Sasang types along with BMI, PI, and type-specific clinical symptoms in school-age boys and girls.

2. Methods

2.1. Participants

A total of 670 students from various high schools in the Daegu metropolitan area completed the SPQ and JTCI, which measure the Sasang personality and Cloninger's temperament characteristics, respectively. The procedures were approved by the Internal Review Board of Kyungil University (2014/11/26-001). All participants provided written informed consent for this study.

2.2. Methods

2.2.1. Sasang Personality Questionnaire
The SPQ[12] is a 14-item self-report questionnaire measuring temperament characteristics of Sasang typology. The SPQ was shown to have acceptable clinical validity and reliable psychometric properties.[12,14,16] Each item is composed of two opposite words describing a specific personality trait, and the participants are asked to choose one of three responses on a three-point Likert scale (1 = delicate, 2 = average or middle, and 3 = tough).

The SPQ is based on the concepts of Yin–Yang and Confucianism, and has three subscales of behavioral (SPQ-B),

cognitive or decision-making (SPQ-C), and emotional (SPQ-E) components of personality. The internal consistency values, as measured by Cronbach α, for SPQ-B, SPQ-C, and SPQ-E from the previous study were 0.789, 0.711, and 0.685, respectively.[12]

2.2.2. Junior version of TCI

The TCI has two dimensions of temperament and character. The temperament determines the automatic tendency for responding to stimuli and the character represents personal value and psychological maturity. The TCI has four temperament dimensions (NS, HA, reward dependence, and persistence) and three character dimensions (self-directedness, cooperativeness, and self-transcendence).[27]

The Korean version of the JTCI is a self-report questionnaire with 82 items and a four-point Likert scale (from 0 = not at all to 3 = very true). The Korean version of the JTCI questionnaire was standardized and validated in 2007, and demonstrated acceptable validity and reliability.[28] The internal consistency values, as measured by Cronbach α, for the JTCI NS, HA, reward dependence, persistence, self-directedness, cooperativeness, and self-transcendence scales were 0.76, 0.81, 0.67, 0.67, 0.74, 0.71, and 0.66, respectively.[28]

2.2.3. BMI and PI

The body measures of height (m) and weight (kg) for calculating BMI and PI were acquired from the school record. The BMI[2] is calculated by dividing the body weight by height squared, and the PI[8] is calculated by dividing the weight by height raised to the power of 3.

2.3. Statistical analysis

Descriptive statistics and Chi-square were used for describing the distribution of sex and school year. Structures of the SPQ and its subscales were examined with factor analysis and Cronbach α. We divided the participants into three groups based on the SPQ total score: high (30%), middle (40%), and low (30%) SPQ score groups, which conceptually correspond to the So-Yang, Tae-Eum, and So-Eum types, respectively.[9]

Subscales of JTCI, BMI, and PI of the high, middle, and low SPQ total score groups were compared with analysis of variance, and Bonferroni or Dunnett's T3 *posthoc* analysis were applied depending on the results of Levene's homogeneity test. Profile analysis for the test of parallelism and flatness was used to investigate the difference of the JTCI subscale profiles for the high, middle, and low SPQ total score groups. The Pearson correlation coefficient was calculated to examine the correlations between the SPQ and the subscales of JTCI, BMI, and PI.

IBM SPSS Statistics 20.0 (IBM, Armonk, NY, USA) was used for statistical analyses. The results of the statistical analyses were presented as frequency (%) or mean ± standard deviation, and statistical significance level was set at $p < 0.05$, $p < 0.01$, and $p < 0.001$.

3. Results

A total of 670 participants, consisting of 365 boys (54.48%) and 305 girls (45.52%), were recruited. The distribution of

Table 1 – Demographic features of the participants

Grade	Boys, n (%)	Girls, n (%)	Total, N (%)
Sophomore	128 (52.67)	115 (47.33)	243 (100)
Junior	116 (48.54)	123 (51.46)	239 (100)
Senior	121 (64.36)	67 (35.64)	188 (100)
Total	365 (54.48)	305 (45.52)	670 (100)

school year and sex is shown in Table 1. Significant differences [$\chi^2 = 11.127$, degrees of freedom (df) = 2, $p = 0.004$] between the frequencies of sex composition and school year were found with the Chi-square analysis. The subscale of SPQ showed significant differences between males and females (Tables 2 and 3). For that reason, we divided the participants into male and female groups and proceeded with the statistical analysis.

3.1. Boys

In male participants, the Cronbach α values of SPQ, SPQ-B, SPQ-C, and SPQ-E were 0.779, 0.803, 0.571, and 0.593, respectively. We divided the male participants into three groups, high (30%), middle (40%), and low (30%) SPQ groups, based on the SPQ total score. The differences in SPQ, JTCI, BMI, and PI measures between the low ($\leq$ 24), middle (25–30), and high ($\geq$ 31) SPQ groups are shown in Table 2. Th SPQ subscales of the low, middle, and high SPQ groups had significant differences and were in increasing orders. As for the psychological perspectives with JTCI (Table 2), the JTCI NS scores (24.12 ± 5.27, 19.45 ± 4.64, and 16.49 ± 5.08, respectively) of the high, middle, and low SPQ groups were in a decreasing order and the TCI HA scores (19.27 ± 6.62, 21.66 ± 6.36, and 25.34 ± 6.08, respectively) were in an increasing order. The profiles of seven JTCI subscales (Fig. 1) of the three SPQ groups were not flat (Greenhouse–Geisser test, df = 6.831, $F = 20.89$, $p < 0.001$), and
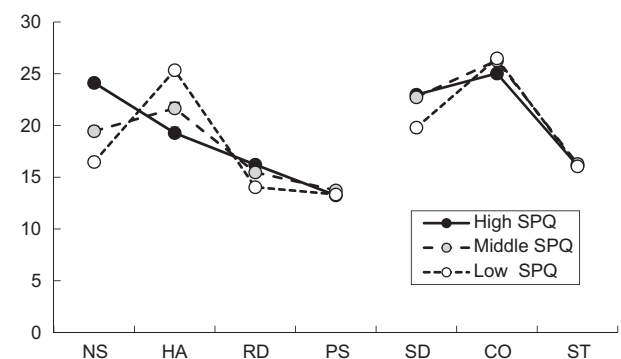

Fig. 1 – Junior version of Temperament and Character Inventory (JTCI) subscale profiles of the High, Middle, and Low Sasang Personality Questionnaire (SPQ) score groups in males. The JTCI subscale profiles of the High, Middle, and Low SPQ score groups were significantly different (flatness with Greenhouse–Geisser test, degrees of freedom = 6.831, F = 20.89, $p < 0.001$; parallelism with Greenhouse–Geisser correction, degrees of freedom = 3.416, F = 292.16, $p < 0.001$). Data are shown as mean and standard errors.
CO, cooperativeness; HA, harm avoidance; NS, novelty seeking; PS, persistence; RD, reward dependence; SD, self-directedness; ST, self-transcendence.

Table 2 – Sasang Personality Questionnaire (SPQ) and Junior version of Temperament and Character Inventory (JTCI) subscale scores of the high, middle, and low SPQ score groups for male high school students

	High SPQ	Middle SPQ	Low SPQ	Total	ANOVA	*Posthoc* analysis
Range, *n* (%)	≥ 31, 113 (30.96)	25–30, 151 (41.37)	≤ 0, 101 (27.67)	365 (100)		
SPQ[*]	34.04 ± 2.53	27.56 ± 1.79	21.46 ± 2.21	27.88 ± 5.28	F = 910.673, df = 362, p < 0.001	High > middle > low
SPQ-B[*]	13.06 ± 1.52	10.21 ± 1.92	7.51 ± 1.65	10.35 ± 2.74	F = 275.565, df = 362, p < 0.001	High > middle > low
SPQ-C[*]	11.85 ± 1.54	9.8 ± 1.38	7.93 ± 1.68	9.92 ± 2.13	F = 178.299, df = 362, p < 0.001	High > middle > low
SPQ-E[*]	9.13 ± 1.77	7.55 ± 1.67	6.01 ± 1.53	7.61 ± 2.05	F = 93.825, df = 362, p < 0.001	High > middle > low
JTCI						
NS[*]	24.12 ± 5.27	19.45 ± 4.64	16.49 ± 5.08	20.08 ± 5.77	F = 65.179, df = 362, p < 0.001	High > middle > low
HA[*]	19.27 ± 6.62	21.66 ± 6.36	25.34 ± 6.08	21.94 ± 6.77	F = 24.501, df = 362, p < 0.001	High < middle < low
RD[*]	16.22 ± 4.34	15.47 ± 3.79	14.04 ± 3.68	15.31 ± 4.02	F = 8.374, df = 362, p < 0.001	High, middle > low
PS	13.25 ± 3.66	13.73 ± 3.27	13.34 ± 3.41	13.48 ± 3.43	F = 0.736, df = 362, p = 0.480	
SD[*]	22.97 ± 5.44	22.73 ± 5.73	19.8 ± 5.76	21.99 ± 5.8	F = 10.618, df = 362, p < 0.001	High, middle > low
CO	25.03 ± 5.77	26.27 ± 5.49	26.49 ± 4.29	25.95 ± 5.3	F = 2.518, df = 362, p = 0.082	
ST	16.13 ± 5.17	16.29 ± 4.52	16.05 ± 4.87	16.17 ± 4.81	F = 0.078, df = 362, p = 0.925	
BMI	21.71 ± 3.11	21.74 ± 3.17	21.83 ± 3.88	21.76 ± 3.35	F = 0.035, df = 362, p = 0.965	
PI	12.38 ± 1.79	12.5 ± 1.81	12.5 ± 2.27	12.46 ± 1.94	F = 0.141, df = 362, p = 0.869	

[*] *p* < 0.001.

ANOVA, analysis of variance; BMI, body mass index; CO, cooperativeness; df, degrees of freedom; HA, harm avoidance; NS, novelty seeking; PI, Ponderal Index; PS, persistence; RD, reward dependence; SD, self-directedness; SPQ-B, Sasang Personality Questionnaire—Behavior; SPQ-C, Sasang Personality Questionnaire–Cognition; SPQ-E, Sasang Personality Questionnaire –Emotionality; ST, self-transcendence.

the parallelism of JTCI profile with the interaction of three groups were significantly different (Greenhouse–Geisser correction, df = 3.416, F = 292.16, p < 0.001), which means that the high, middle, and low SPQ groups (representing, respectively, the So-Yang, Tae-Eum, and So-Eum groups) are statistically significantly different from each other. The SPQ score has a significant correlation with JTCI NS (r = 0.548, p < 0.001) and HA (r = −0.393, p < 0.001) (Table 4).

As for the physical features, BMI and PI have no significant differences among the low, middle, and high SPQ groups (Table 2). The Pearson's correlation coefficient of BMI (r = 0.004) and PI (r = −0.016) were not significant (Table 4). Thus, the SPQ

and physical traits of BMI and PI were shown to be independent in males.

3.2. Girls

In female participants, the Cronbach α values of SPQ, SPQ-B, SPQ-C, and SPQ-E were 0.724, 0.750, 0.431, and 0.521, respectively. We divided the female participants into three groups, high (30%), middle (40%), and low (30%) SPQ groups, based on the SPQ total score. The differences in SPQ, JTCI, BMI, and PI measures between the low (≤ 26), middle (27–31), and high (≥ 32) SPQ groups are shown in Table 3.

Table 3 – Sasang Personality Questionnaire (SPQ) and Junior version of Temperament and Character Inventory (JTCI) subscale scores of the high, middle, and low SPQ score groups for female high school students

	High SPQ	Middle SPQ	Low SPQ	Total	ANOVA	*Posthoc* analysis
Range, *n* (%)	≥ 32, 94 (30.82)	27–31, 116 (38.03)	≤ 16, 95 (31.15)	305 (100)		
SPQ[*]	34.32 ± 2.04	29.06 ± 1.33	23.47 ± 2.21	28.94 ± 4.66	F = 799.094, df = 302, p < 0.001	High > middle > low
SPQ-B[*]	13.16 ± 1.42	10.99 ± 1.73	8.46 ± 1.92	10.87 ± 2.51	F = 179.846, df = 302, p < 0.001	High > middle > low
SPQ-C[*]	11.46 ± 1.51	9.8 ± 1.3	8.04 ± 1.41	9.76 ± 1.94	F = 140.74, df = 302, p < 0.001	High > middle > low
SPQ-E[*]	9.7 ± 1.43	8.27 ± 1.53	6.97 ± 1.65	8.3 ± 1.87	F = 74.597, df = 302, p < 0.001	High > middle > low
JTCI						
NS[*]	24.15 ± 5.17	20.31 ± 4.92	17.24 ± 4.83	20.54 ± 5.66	F = 45.822, df = 302, p < 0.001	High > middle > low
HA[*]	19.23 ± 6	22.06 ± 6.49	26.64 ± 5.77	22.61 ± 6.78	F = 35.38, df = 302, p < 0.001	High < middle < low
RD[*]	19.34 ± 3.77	17.55 ± 4.29	16.73 ± 3.62	17.85 ± 4.06	F = 10.881, df = 302, p < 0.001	High > middle, low
PS	13.77 ± 3.19	13.88 ± 3.54	13.39 ± 3.06	13.69 ± 3.29	F = 0.613, df = 302, p = 0.543	
SD[*]	23.08 ± 5.18	21.6 ± 6.38	19.24 ± 5.67	21.32 ± 5.99	F = 10.531, df = 302, p < 0.001	High, middle > low
CO	26.57 ± 5.21	27.09 ± 4.79	27.69 ± 4.97	27.12 ± 4.98	F = 1.201, df = 302, p = 0.302	
ST	18.21 ± 4.79	17.56 ± 4.4	17.72 ± 4.77	17.81 ± 4.63	F = 0.527, df = 302, p = 0.591	
BMI	19.88 ± 2.23	20.61 ± 2.83	20.25 ± 2.64	20.27 ± 2.61	F = 2.036, df = 302, p = 0.132	
PI	12.33 ± 1.43	12.74 ± 1.86	12.58 ± 1.71	12.57 ± 1.69	F = 1.527, df = 302, p = 0.219	

[*] *p* < 0.001.

ANOVA, analysis of variance; BMI, body mass index; CO, cooperativeness; df, degrees of freedom; HA, harm avoidance; NS, novelty seeking; PI, Ponderal Index; PS, persistence; RD, reward dependence; SD, self-directedness; SPQ-B, Sasang Personality Questionnaire—Behavior; SPQ-C, Sasang Personality Questionnaire—Cognition; SPQ-E, Sasang Personality Questionnaire—Emotionality; ST, self-transcendence.

Table 4 – Correlation coefficients between subscales of Sasang Personality Questionnaire (SPQ) and Junior version of Temperament and Character Inventory (JTCI) in male high school students

	SPQ			JTCI							BMI	PI
	SPQ-B	SPQ-C	SPQ-E	NS	HA	RD	PS	SD	CO	ST		
SPQ	0.837[*]	0.771[*]	0.659[*]	0.548[*]	−0.393[*]	0.233[*]	−0.042	0.233[*]	−0.118[†]	0.003	0.004	−0.016
SPQ-B		0.498[*]	0.304[*]	0.352[*]	−0.453[*]	0.343[*]	0.186[*]	0.378[*]	0.066	0.085	−0.030	−0.040
SPQ-C			0.281[*]	0.405[*]	−0.421[*]	0.004	−0.151[‡]	0.218[*]	−0.123[†]	−0.076	−0.017	−0.046
SPQ-E				0.522[*]	0.031	0.136[‡]	−0.199[*]	−0.131[†]	−0.266[*]	−0.028	0.067	0.059

Bold represents values bigger than 0.3.
[*] $p < 0.001$.
[†] $p < 0.05$.
[‡] $p < 0.01$.

BMI, body mass index; CO, cooperativeness; HA, harm avoidance; NS, novelty seeking; PI, Ponderal Index; PS, persistence; RD, reward dependence; SD, self-directedness; SPQ-B, Sasang Personality Questionnaire—Behavior; SPQ-C, Sasang Personality Questionnaire—Cognition; SPQ-E, Sasang Personality Questionnaire—Emotionality; ST, self-transcendence.
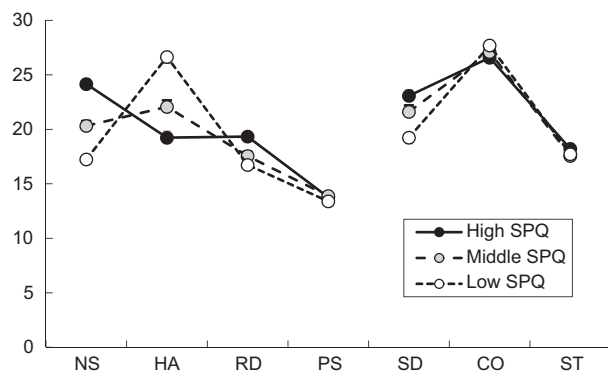

Fig. 2 – Junior version of Temperament and Character Inventory (JTCI) subscale profiles of the High, Middle, and Low Sasang Personality Questionnaire (SPQ) score groups in females. The JTCI subscale profiles of the High, Middle, and Low SPQ score groups were significantly different (flatness with Greenhouse–Geisser test, degrees of freedom = 6.802, F = 20.43, p < 0.001; parallelism with Greenhouse–Geisser correction, degrees of freedom = 3.4, F = 230.51, p < 0.001). Data are shown as mean and standard errors. CO, cooperativeness; HA, harm avoidance; NS, novelty seeking; PS, persistence; RD, reward dependence; SD, self-directedness; ST, self-transcendence.

The SPQ subscales of the low, middle, and high SPQ groups had significant differences and were in an increasing order. As for the psychological perspectives with JTCI (Table 3), the JTCI NS scores (24.15 ± 5.17, 20.31 ± 4.92, and 17.24 ± 4.83, respectively) of the high, middle, and low SPQ groups were in a decreasing order and the TCI HA scores (19.23 ± 6, 22.06 ± 6.49, and 26.64 ± 5.77, respectively) were in an increasing order. The profiles of seven JTCI subscales (Fig. 2) of the three SPQ groups were not flat (Greenhouse–Geisser test, df = 6.802, F = 20.43, $p < 0.001$), and the parallelism of JTCI profile with the interaction of three groups were significantly different (Greenhouse–Geisser correction, df = 3.4, F = 230.51, $p < 0.001$). Therefore, the high, middle, and low SPQ groups (representing the So-Yang, Tae-Eum, and So-Eum groups, respectively) are statistically significantly different from each other. The

SPQ score has a significant correlation with JTCI NS ($r = 0.540$, $p < 0.001$) and HA ($r = −0.395$, $p < 0.001$) (Table 5).

As for the physical features, BMI and PI have no significant differences among the low, middle, and high SPQ groups (Table 2). The Pearson's correlation coefficient of BMI ($r = −0.020$) and PI ($r = −0.03$) were not significant (Table 5). Thus, the SPQ and physical traits of BMI and PI were shown to be independent in females.

4. Discussion

This study examined the psychobiological validity of the SPQ in Korean high school students. The SPQ has a significant positive correlation with JTCI NS and negatively with JTCI HA; however, no significant correlation was found with BMI and PI, representing physical traits. The high, middle, and low SPQ score groups are in decreasing order with JTCI NS and increasing order with JTCI HA, although no significant differences in BMI and PI. That is, the psychobiological structure of the SPQ in high school students shown in the present study is consistent with that reported in previous studies in adults[6,8,10,12,16,17]; therefore, the use of the SPQ would be appropriate in both adolescents and adults.

Since the SPQ is a clinical instrument measuring temperament perspectives of traditional Korean medicine in adults, it could be used for various pediatric applications such as screening,[26,29] patient education[30] and treatment[31] of problem behaviors, nutrition, physical development,[21,32] and character development.[27] Childhood and adolescence are periods for growth into adulthood with rapid physical development and psychological maturation, and the foundation for lifetime health condition would be established when the Sasang type-specific biopsychological weakness is screened and intervened at a young age. Nonetheless, studies on Sasang typology in adolescents were not implemented enough, and objective instruments with acceptable validity and clinical usefulness have not been reported until now.

Although the Sasang type-specific clinical features[33] described in Jema Lee's Longevity and Life Preservation in Eastern Medicine[1] do not provide substantial descriptions of objective measures, there have been a lot of studies on the quantitative aspects of Sasang in adults after the

Table 5 – Correlation coefficients between subscales of Sasang Personality Questionnaire (SPQ) and Junior version of Temperament and Character Inventory (JTCI) in female high school students

	SPQ			JTCI							BMI	PI
	SPQ-B	SPQ-C	SPQ-E	NS	HA	RD	PS	SD	CO	ST		
SPQ	0.795*	0.750*	0.645*	0.540*	−0.395*	0.290*	0.027	0.245*	−0.102	0.022	−0.020	−0.033
SPQ-B		0.401*	0.223*	0.252*	−0.511*	0.333*	0.265*	0.457*	0.109	0.086	−0.062	−0.072
SPQ-C			0.295*	0.463*	−0.371*	0.014	−0.116†	0.156‡	−0.144†	−0.052	0.041	0.029
SPQ-E				0.526*	0.087	0.260*	−0.169‡	−0.166‡	−0.251*	−0.006	−0.009	−0.015

* $p < 0.001$.
† $p < 0.05$.
‡ $p < 0.01$.

BMI, body mass index; CO, cooperativeness; HA, harm avoidance; NS, novelty seeking; PI, Ponder Index; PS, persistence; RD, reward dependence; SD, self-directedness; SPQ-B, Sasang Personality Questionnaire—Behavior; SPQ-C, Sasang Personality Questionnaire—Cognition; SPQ-E, Sasang Personality Questionnaire—Emotionality; ST, self-transcendence.

demise of Jema Lee. Unfortunately, there have been only a few studies with qualitative or quantitative descriptions in children or adolescents. For example, for elementary school students, studies on body shape and temperaments,[34] type-specific clinical symptoms,[35] phonetic characteristics,[22] Sasang type-specific psychological traits,[36] body shape,[21] and body composition and diet[32] were examined with the use of Questionnaire for Sasang Constitution Classification (QSCC) or by Sasang clinical specialists.

In addition, the aforementioned studies reported no significant differences in psychological traits between Sasang types. Research only demonstrated the obesity-related physical characteristics of the Tae-Eum type, and its findings were wrongly inferred from the misconception that, in case of adults, the Tae-Eum type is merely portrayed as fat and obese.[8] The truth is that the book Longevity and Life Preservation in Eastern Medicine described the physical characteristics of the Tae-Eum type as tall and big, and not as fat and obese, and those of the So-Eum type as short and small.[1] In other words, as for elementary school students, no quantitative psychological traits have been discovered.

Two studies have explored the psychological traits in high school students. For instance, the TCI subscale profile of Sasang typology has been replicated in studies with 543 high school male students using the SPQ for Sasang type classification[25] and 89 middle school female students using the Two Step Questionnaire for the Sasang Constitution Diagnosis.[37] These findings are consistent with those of previous studies[5,10–12,38] that the So-Yang and So-Eum Sasang types have high NS and HA scores, respectively, regardless of age. There might be a theoretical background that there are genetic and biological associations between TCI NS and the behavioral activation system, and between TCI HA and the behavioral inhibition system,[9–11] the biological basis of which seems to make the Sasang type-specific psychobiological traits stable throughout the lifetime.[39–43]

The findings of the present study regarding the correlation between the SPQ subscale and the JTCI NS and HA in adolescents were predicted by previous studies.[12,17,44] The NS has a significant correlation with all three SPQ subscales of SPQ-B, SPQ-C, and SPQ-E; however, the HA has a significant correlation with SPQ-B and SPQ-C, but not with SPQ-E in this study. This result means that the low score in the emotionality

subscale of traditional Korean medicine is not related to the anxiety, fear, nervousness, or instability of emotion in Western medicine, and furthermore it is related negatively with TCI persistence and TCI reward dependence, which might be interpreted as retracted, detached or withdrawn, negative, aloof, depressed, emotionally stagnant, and static.[9,27] The unstable emotionality or anxiety has been considered as the fundamental and universal temperament trait of human personality in Western medicine and philosophy; however, the Eastern medicine and Confucianism have considered emotionality (SPQ-E) as a character trait to be educated and developed, which was shown here as a correlation between SPQ-E and TCI self-directedness and TCI cooperativeness.[9,27,44]

This study might have limitations for generalization. First, the SPQ-C has a relatively low Cronbach α compared with that reported in previous studies in adults. This might come from the fact that this questionnaire was developed and validated for adults, and therefore adolescents could possibly have difficulties in answering some questions. Although the JTCI subscale profile is acceptable in this study, a revision is required to make it suitable for school-age individuals. Second, the participants of this study were high school students from a specific metropolitan area; therefore, a further analysis with nationwide adolescent samples is needed. Third, there are sex differences in SPQ scores as shown in adults, and different cutoff scores were applied for boys and girls.[17] Although the sex difference in psychobiological characteristics has been reported previously,[1,5,17] we need to examine whether the questionnaire itself has sex-related items.

We examined the psychobiological validity of the SPQ with JTCI, BMI, and PI in 670 Korean high school students, and showed that the SPQ measures the fundamental temperament not only in adults but also in adolescents. The SPQ would be useful for screening Sasang type-related clinical weakness and providing type-specific prevention, treatment, and rehabilitation in pediatric practice with further validation studies in middle and elementary school students.

Conflicts of Interest

The authors declare no conflict of interest related to affiliated or sponsoring organizations.

Acknowledgments

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