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Validity of Yin-Yang temperament in Sasang Personality Questionnaire

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ABSTRACT

Background: The Yin-Yang is a pivotal concept of traditional East-Asian medicine, however the stability of Yin-Yang temperament in Sasang Personality Questionnaire (SPQ) over time has not been extensively studied. The purpose of this study was to examine the test-retest validity of SPQ with a large number of participants.

Methods: SPQ test was conducted two times with three months interval in 247 Korean university students. The structural validity of first SPQ data was examined with Factor analysis and Cronbach's alpha, and the correlation between first and second measure of SPQ was attested with Pearson's correlation. Yang, Uncertain and Yin temperament groups were determined with SPQ total scores, and agreement of temperament group clustering between first and second measures were analyzed with Cohen's Kappa.

Results: Three subscales of SPQ explained 55.25% of total variances, and internal consistency of SPQ total score was 0.772. The correlation coefficient between first and second measures of SPQ were 0.851 and 0.888 in male and female, respectively, and the agreement of first and second Yin-Yang temperament group clustering as Cohen's Kappa was 0.536 for male and 0.637 for female.

Conclusion: The repeatability of SPQ measuring Yin-Yang temperament at three months of interval was found to be satisfactory. The SPQ would be a reliable clinical measure for the biopsychological studies of traditional East-Asian medicine.

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1. Introduction

Yin-Yang (Eum and Yang in Korean) represents two opposing and complementary traits (categorical) or quality (numerical) of nature such as introvert and extrovert, negative and positive, passive and active, cold and hot, female and male, moon and sun, night and day, dark and bright, slow and fast, stable and dynamic, and so forth.¹⁻³ It has been used as pivotal term for the traditional Eastern philosophy, psychology, biology, and medicine, however only the traditional medicine was the practical science survived after the modernization of the East.⁴⁻⁶

The Yin-Yang is the term not only for describing biological perspectives but also for the psychological characteristics of human nature in traditional East-Asian medicine.^{7,8} Though ninety percent of chapters in the book *Yellow Emperor's Inner Canon*³ deals biopsychological features,⁸ the biopsychological studies on Yin-Yang were not satisfactory for the lack of reliable clinical tools till now. Recently, Sasang Personality Questionnaire (SPQ) was implemented as objective measure for describing biopsychological and pathophysiological features of Yin-Yang temperament with three perspectives of behavior, cognition and emotionality.^{2,9}

The SPQ was reported to have reliable psychobiological structure when compared with well-established western personality tests of Temperament and Character Inventory and NEO Personality Inventory,⁹⁻¹⁴ and satisfactory clinical validity in adults,^{9,14-16} adolescents^{7,17-19} and elementary students.²⁰ The SPQ-Behavior was reported to be related with vitality¹⁵ and the SPQ-Emotionality was shown to predict psychopathological features in adolescents.^{7,19}

Although the SPQ was found to be a reliable measurement of Yin-Yang temperament, the test-retest interval was relatively short as four weeks and the sample size is relatively small only with medical students.^{9,21} Considering the importance of Yin-Yang theory in East-Asian medicine,² there is a need for generalizable evidence supporting the clinical use of Yin-Yang temperament with SPQ. For this reason, we recruited large group of university students composed of various majors and tested twice with three months of interval to examine the stability of Yin-Yang temperament in this study.

The structural validity and internal consistency of SPQ was examined with Factor analysis and Cronbach's alpha, and the correlation between Yin-Yang temperament and anthropometric measure was examined with Pearson's correlation among SPQ, Body Mass Index and Ponderal Index in this study. The stability of Yin-Yang temperament over time was studied in two ways considering numerical and categorical perspectives of Yin-Yang temperament as shown elsewhere;² the correlation between first and second SPQ measures was examined with Pearson's correlation,⁹ and the agreement of Yin-Yang temperament group clustering between first and second SPQ measures was examined with Cohen's Kappa.

This study might show the stability of Yin-Yang temperament in young adults, and the SPQ would be clinical useful as a diagnostic tool that might be used for personalized prediction, prevention and treatment with traditional Korean medicine.^{2,6,7}

2. Methods

2.1. Subjects and procedures

313 university students regardless of age, sex and major were recruited for this study, and asked to complete SPQ in the third and fifteenth week of the semester. Data from 247 students who provided first and second SPQ test and their weight and height were also asked to provide in this study. This study was approved by Institutional Review Board (PNU IRB/2015_59_HR) in advance, and the participants were asked to complete informed consent form.

2.2. Methods

2.2.1. Sasang Personality Questionnaire (SPQ)

The SPQ is a self-report questionnaire measuring Yin-Yang temperament reported to be useful for Sasang typology with proven clinical validity.^{2,7,9,21} Each item is composed of two opposing words describing specific personality trait and requires to select one of three answers (e.g., 1=easy-going, 2=not sure, 3=meticulous).

The SPQ has its theoretical basis on psychobiological studies on Yin-Yang and Confucianism, and was consisted of three subscales including behavioral (SPQ-Behavior, SPQ-B) components of personality (passive or active), cognitive or decision-making (SPQ-Cognition, SPQ-C) components of personality (easy-going or meticulous) and emotional (SPQ-Emotionality, SPQ-E) components of personality (static or dynamic).⁹ The internal consistency of SPQ total, SPQ-B, SPQ-C and SPQ-E as Cronbach's alpha in previous study were 0.722, 0.769, 0.581 and 0.641, respectively.⁹

The upper 30% of SPQ total score group is classified as Yang temperament, the lower 30% of SPQ total score group as Yin temperament and the middle 40% of SPQ total score group as uncertain temperament.⁷ The biopsychological traits of Yin and Yang temperament groups might be summarized as follows based on previous studies.^{2,14,20-22}

The Yang temperament persons actively express their opinion and explicitly reveal dynamic changes of their emotion. As for the physical characteristics, they tend to have good digestive function, congested-heat symptom pattern, and yin-deficiency symptom pattern and/or physical fatigue from excessive activities. The Yin temperament persons are reluctant to disclose their feelings and express their thoughts indirectly with passive attitude. As for their physical perspective, weak digestive function, deficiency-heat symptom pattern, and cold symptom pattern from lack of uprising Yang Qi are commonly observed.⁷

2.2.2. Body Mass Index (BMI) and Ponderal Index (PI)

Anthropometric measures were calculated with height (m) and weight (Kg) provided by the participants. Body Mass Index (kg/m²) for degree of obesity is a value of weight divided by square of height, and Ponderal Index (Kg/m³) for physical development and lean body mass²³ is a value of weight divided by three times of height which represent the anthropometric traits of Sasang typology.¹⁶ PI is reported to be used when there is a big height differences among subjects and is also used to

adjust the error of BMI especially in pediatrics. The Tae-Eum Sasang type with uncertain temperament has reported to have high Ponderal Index, Body Mass Index, and bigger chest and neck circumferences than the So-Yang and So-Eum Sasang types which represents Yang and Yin temperament groups, respectively.^{14,16}

2.3. Statistical analysis

Descriptive statistics were used for the demographic features of subjects in this study. We examined significant differences between male and female with T-test in age, SPQ total and subscale scores, weight, height, Body Mass Index and Ponderal Index, and with χ^2 test in grade, age and major distribution.

The factor analysis was used to extract subscales of SPQ using principal axis extraction and Varimax rotation with an Eigen value over 1.0 as the criteria, and Cronbach's alpha was used to analyze the internal consistency of SPQ and its subscales. The Pearson's correlation was used to examine correlations among first SPQ score, weight, height, BMI and PI to examine the individuality of temperament from anthropometric measures.

The stability of Yin-Yang temperament measured with SPQ was examined with Pearson's correlation and Cohen's Kappa considering numerical and categorical perspectives in males and females. The Pearson's correlation was used to examine correlations between first and second measures of SPQ and its subscales, and the Cohen's Kappa was performed to assess the agreement of first and second Yin-Yang temperament clustering with SPQ measures. As to determine the Yin-Yang temperament group of subject following procedures are implemented. The high (30%), middle (40%) and low (30%) SPQ score groups corresponding Ying, uncertain and Yin temperament groups were clustered based on the first and second measures of SPQ total score. Analysis of Variance (ANOVA) was used to assure significant differences among three temperament groups in first and second measures, and Bonferroni or Dunnett's T3 as for the post-hoc analysis was used according to Levene's homogeneity test results.

IBM SPSS statistics 20.0 (IBM, Armonk, NY) was used for the statistical analysis. The results of descriptive analysis were presented as frequency (%) or mean \pm standard deviation, and statistical significance level was set as $p < 0.05$, $p < 0.01$, and $p < 0.001$.

3. Results

Subjects for this study were 89 (36%) male and 158 (64%) female university students, and significant differences were found in age distribution ($\chi^2 = 42.439$, $p < 0.001$) but not in grade ($\chi^2 = 2.067$, $p = 0.559$) and major ($\chi^2 = 18.948$, $p = 0.090$). Students under 19 (24.7%) and over 23 (34.8%) were the majority in male students, however, in female students, under 19 (31.7%) and 20 (29.7%) were the majority (Table 1).

There were significant differences in biopsychological features between male and female students. Females (7.04 ± 2.24) were significantly ($p < 0.001$) higher than males (8.19 ± 2.17) in SPQ-Emotionality, however males (67.51 ± 10.15 , 173.73 ± 5.09 and 22.31 ± 2.84) were significantly ($p < 0.001$) higher than

female (51.92 ± 5.53 , 160.91 ± 4.50 and 20.06 ± 2.03) in weight, height and BMI (Table 1).

Factor analysis was performed to examine the structural validity of the SPQ test, and three subscales were yielded with principal axis extraction and Varimax rotation (Table 2). Three subscales of SPQ-B, SPQ-C and SPQ-E explained 52.55% of total variance. As shown in Table 3, unlike previous study,⁹ meticulous vs. hasty act of SPQ-Cognition subscale was found to be a member of SPQ-Emotionality, and the degree of expression in inner thoughts and feeling of SPQ-Emotionality subscale might also be considered as a member of SPQ-Behavior. Cronbach's alpha was used to assess the internal consistency of SPQ total and subscales, and that of SPQ total, SPQ-Behavior, SPQ-Cognition and SPQ-Emotionality were 0.772, 0.769, 0.581, and 0.641, respectively.

The SPQ total score measured at first wave showed significant ($p < 0.001$) correlation with SPQ-B ($r = 0.831$), SPQ-C ($r = 0.738$), and SPQ-E ($r = 0.643$). As for the correlation between temperament and anthropometric measures, we found these were mutually independent (Table 4). The SPQ total score did not show any significant correlation coefficient with weight ($r = 0.013$), height ($r = 0.056$), BMI ($r = -0.024$) and PI ($r = -0.047$), however the SPQ-C has weak correlation with height ($r = 0.139$, $p < 0.05$) in this study.

The Pearson's correlation was used to examine correlation between first and second SPQ measures, and significantly high correlation was revealed. The correlation coefficient of SPQ total score (27.34 ± 5.51 and 27.24 ± 5.45 , respectively), SPQ-B (10.15 ± 2.83 and 10.06 ± 2.76), SPQ-C (9.42 ± 2.32 and 9.40 ± 2.25), and SPQ-E (7.78 ± 2.25 and 7.78 ± 2.23) of first and second measures were 0.877, 0.866, 0.786, and 0.772. These results might be recognized as confirmation of stability of SPQ measuring Yin and Yang temperament over three months of time.

We also examined the correlation between first and second SPQ measures in males and females, separately, and there were significant correlations (Table 5). The correlation coefficient of SPQ total, SPQ-B, SPQ-C, and SPQ-E were 0.851, 0.838, 0.81, and 0.719 in male students and 0.888, 0.868, 0.777, and 0.779 in female students, respectively.

The SPQ subscale scores of Yang, Uncertain and Yin temperament groups in first (Table 6) and second (Table 7) measures were described separately as for males and females. The ANOVA was used to confirm significant differences of SPQ total, SPQ-B, SPQ-C and SPQ-E among three temperament groups, and those of Yang, uncertain and Yin temperament groups were in decreasing order as previous study.²

The agreement of first and second temperament measures was shown in Table 8, and the Cohen's Kappa was 0.536 for male and 0.637 for female. It was found that 69.7% (62/89) of male and 76% (120/158) of female subjects were categorized as same temperament group in first and second measures, and none was found to interchange between Yang and Yin temperament groups.

4. Discussion

The purpose of this study was to examine clinical validity of Sasang Personality Questionnaire (SPQ) measuring Yin-Yang

Table 1 – Demographic features of participants in this study.

	Male	Female	Total	Statistical analysis
Total (n (%))	89(36.03)	158(63.64)		
Grade				$\chi^2 = 2.067, p = 0.559$
1	31(34.8)	45(28.5)	76(30.77)	
2	25(28.1)	47(29.7)	72(29.15)	
3	19(21.3)	31(19.6)	50(20.24)	
4	14(15.7)	35(22.2)	49(19.84)	
Age ^{***}	21.57 ± 2.20	20.29 ± 1.44		t = 4.924, p < 0.001
<19	22(24.7)	50(31.7)	72(29.15)	$\chi^2 = 42.439, p < 0.001$
20	9(10.1)	47(29.7)	56(22.67)	
21	10(11.2)	29(18.4)	39(15.79)	
22	17(19.1)	18(11.4)	35(14.17)	
>23	31(34.8)	14(8.9)	45(18.22)	
Major				$\chi^2 = 18.948, p = 0.090$
Business	4(4.5)	8(5.1)	12(4.9)	
Economy & Trade	8(9.0)	18(11.4)	26(10.53)	
Engineering & Nano Tech.	12(13.5)	8(5.1)	20(8.10)	
Education	7(7.9)	8(5.1)	15(6.07)	
Sociology	13(14.6)	30(19.0)	43(17.41)	
Bio-resources	5(5.6)	4(2.5)	9(3.64)	
Environment	1(1.1)	8(5.1)	9(3.64)	
Arts	1(1.1)	11(7.0)	12(4.9)	
Humanities	18(20.2)	35(22.2)	53(21.46)	
Natural Science	14(15.7)	24(15.2)	38(15.38)	
Nursing/Dental	6(6.8)	4(2.5)	10(4.05)	
Temperament measure				
SPQ total	26.54 ± 5.38	27.80 ± 5.55		t = -1.729, p = 0.085
SPQ-Behavior	10.02 ± 2.86	10.22 ± 2.82		t = -0.530, p = 0.597
SPQ-Cognition	9.47 ± 2.21	9.39 ± 2.38		t = 0.279, p = 0.781
SPQ-Emotionality ^{***}	7.04 ± 2.24	8.19 ± 2.17		t = -3.943, p < 0.001
Anthropometric measures				
Weight (kg) ^{***}	67.51 ± 10.15	51.92 ± 5.53		t = 13.407, p < 0.001
Height (cm) ^{***}	173.73 ± 5.09	160.91 ± 4.50		t = 20.473, p < 0.001
Body Mass Index ^{***}	22.31 ± 2.84	20.06 ± 2.03		t = 6.614, p < 0.001
Ponderal Index	12.85 ± 1.60	12.48 ± 1.37		t = 1.890, p = 0.060

* p < 0.05; ** p < 0.01.
*** p < 0.001.

Table 2 – Extraction of SPQ subscales with factor analysis using principal axis extraction and Varimax rotation.

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Eigenvalue	Percent of variance	Cumulative percent	Eigenvalue	Percent of variance	Cumulative percent
1	3.833	27.381	27.381	3.293	27.381	27.381
2	2.205	15.747	43.128	2.447	15.747	43.128
3	1.319	9.421	52.549	2.492	9.421	52.549

temperament over three months with 247 university students. This study showed the structural validity of SPQ was acceptable and the stability of Yin-Yang temperament over three months was noteworthy.

The SPQ is a clinical instrument for Yin-Yang temperament with proven validity in adults of 20s-70s,^{2,9,14} high school students,^{18,19} middle school students^{7,17} and elementary school students.²⁰ Though previous studies^{9,21} have showed acceptable test-retest validity of SPQ with limited number of medical students and others, however, this study provided generalizable stability with large sample sized university students in Busan metropolitan area.

There were significant differences in age and SPQ-E score between male and female participants (Table 1). Students aged 20 (29.7%) and under 19 (31.7%) were the majority in females,

however, aged under 19 (24.7%) and over 23 (34.8%) were the majority in males. This might come from the sociocultural fact that the male students should leave university for the mandatory military service during the age from 20 to 22. And, the fact that female has high percentage (61.7%) of students under 20 who is psychologically unstable from the stress of unfamiliar social environment might be the reason why the SPQ-E score of females is significantly higher than that of males.

As for the SPQ subscale structure it was acceptable in this study (Table 3), however several SPQ items revealed different factor loading than those in the previous studies.^{2,9} The item selecting meticulous vs. hasty act of SPQ-Cognition subscale showed high factor loading on SPQ-Emotionality, and the degree of expressing their inner thoughts and feelings of SPQ-Emotionality subscale also has high factor loading on

Table 3 – Extracted and rotated factor loading matrix of SPQ subscales and questionnaire items.

Questionnaire items		Factor loading		
		1	2	3
SPQ-Behavior	Is your personality relatively introverted or extroverted?	.760	.453	
	Do you tend to not express your opinions or express well?	.755		
	Do you consider yourself relatively lethargic or energetic?	.743		
	Do you consider yourself passive or proactive?	.727		
	Are you relatively slow or quick?	.423	.400	
SPQ-Cognition	Do you have a delicate or tough personality?		.695	
	Do you consider yourself feminine or masculine?		.667	
	In general, do you make decisions with difficulty or with ease?		.651	
	Do you tend to be relatively indirect or direct when expressing yourself?		.543	
	Do you tend to act meticulously or hastily?			.724
SPQ-Emotionality	Do you tend to be logical or do you sometimes get excited?			.747
	Do you tend to experience little emotional change or big emotional change?			.637
	Are you relatively patient or impatient?			.583
	Do you consider yourself as someone who expresses inner thoughts and feelings a little or a lot?	.628		.406

Factor loading bigger than 0.4 shown.

Table 4 – Correlation coefficient between temperament and anthropometric measures.

	Temperament			Anthropometrics			
	SPQ-B	SPQ-C	SPQ-E	Weight	Height	BMI	PI
SPQ total	.831***	.738***	.643***	.013	.056	-.024	-.047
SPQ-B		.465***	.299***	.026	.094	-.031	-.067
SPQ-C			.192**	.113	.139*	.053	-.002
SPQ-E				-.116	-.123	-.075	-.030

BMI, Body Mass Index; PI, Ponderal Index.
 * p < 0.05.
 ** p < 0.01.
 *** p < 0.001.

Table 5 – Correlation coefficient between first and second measures of SPQ over three months of interval.

	First test	Second test	Pearson's correlation
Male			
SPQ total	26.54 ± 5.38	26.51 ± 5.33	0.851***
SPQ-Behavior	10.03 ± 2.86	10.10 ± 2.63	0.838***
SPQ-Cognition	9.47 ± 2.21	9.36 ± 2.38	0.810***
SPQ-Emotionality	7.04 ± 2.24	7.04 ± 2.12	0.719***
Female			
SPQ total	27.80 ± 5.55	27.65 ± 5.48	0.888***
SPQ-Behavior	10.22 ± 2.82	10.04 ± 2.84	0.868***
SPQ-Cognition	9.39 ± 2.38	9.42 ± 2.17	0.777***
SPQ-Emotionality	8.19 ± 2.17	8.19 ± 2.19	0.779***

*** p < 0.001.

SPQ-Behavior, unlike the previous study.⁹ As for the structural validity of SPQ subscales, the internal consistency of SPQ total, SPQ-B, SPQ-C, and SPQ-E were 0.772, 0.769, 0.581 and 0.641 in this study. Considering that one study⁹ with university students showed internal consistency of SPQ-B, SPQ-C and SPQ-E as 0.789, 0.711 and 0.685, and another² with middle school students as 0.752, 0.395 and 0.551 in males and 0.759, 0.478 and 0.421 in females, the structure of SPQ (Table 3) is acceptable.

The Yin-Yang temperament with SPQ and anthropometric measures of BMI, weight, height and PI were found to be dissociated (Table 4), and it is consistent with previous studies^{2,9,14,20,21} which showed trivial or insignificant correlations between these. These results might supporting the

previous studies^{2,16,24,25} that the physical constitution and psychological temperament characteristics of Sasang typology measured with BMI, PI and SPQ are clinically independent.

The stability of Yin-Yang temperament over time is pivotal for the East-Asian medicine^{7,8} and it was found acceptable in this study. The stability of Yin-Yang temperament of SPQ measure over three months was examined with Cohen's Kappa (Table 8) and Pearson's correlation (Table 5) considering categorical and numerical perspectives of Yin-Yang temperament measures. The agreement of first and second temperament measures analyzed with Cohen's Kappa was 0.536 for males and 0.637 for females which means substantial agreement. The percentage of subjects categorized as same temperament

Table 6 – SPQ total and subscales of Yang, uncertain and Yin temperament groups at the first measure.

	Yang	Uncertain	Yin	total	ANOVA	Post-hoc analysis
Male						
Range	(SPQ ≥30)	(23-29)	(≤22)			
N (%)	27 (30.3)	36 (40.4)	26 (29.2)	89 (100)		
SPQ	33.07 ± 2.57	26.17 ± 2.00	20.27 ± 1.51	26.54 ± 5.38	F = 253.391, df = 2,86, p < 0.05	Yang > uncertain > Yin
SPQ-B	12.89 ± 1.63	9.86 ± 2.29	7.27 ± 1.37	10.02 ± 2.86	F = 60.163, df = 2,86, p < 0.05	Yang > uncertain > Yin
SPQ-C	11.63 ± 1.57	9.19 ± 1.74	7.62 ± 1.30	9.47 ± 2.21	F = 44.217, df = 2,86, p < 0.05	Yang > uncertain > Yin
SPQ-E	8.56 ± 1.97	7.11 ± 2.14	5.38 ± 1.36	7.04 ± 2.24	F = 18.729, df = 2,86, p < 0.05	Yang > uncertain > Yin
Female						
Range	(≥31)	(25-30)	(≤24)			
N (%)	48 (30.4)	61 (38.6)	49 (31.)	158 (100)		
SPQ	34.52 ± 2.61	27.52 ± 1.83	21.56 ± 2.19	27.80 ± 5.55	F = 451.502, df = 2,155, p < 0.05	Yang > uncertain > Yin
SPQ-B	13.25 ± 1.38	9.95 ± 1.89	7.59 ± 1.83	10.22 ± 2.82	F = 130.400, df = 2,155, p < 0.05	Yang > uncertain > Yin
SPQ-C	11.60 ± 2.20	9.11 ± 1.71	7.55 ± 1.31	9.39 ± 2.38	F = 64.714, df = 2,155, p < 0.05	Yang > uncertain > Yin
SPQ-E	9.67 ± 1.77	8.46 ± 1.80	6.41 ± 1.64	8.19 ± 2.17	F = 43.487, df = 2,155, p < 0.05	Yang > uncertain > Yin

SPQ, Sasang Personality Questionnaire; SPQ-B, SPQ-Behavior; SPQ-C, SPQ-Cognition; SPQ-E, SPQ-Emotionality.

Table 7 – SPQ total and subscales of Yang, uncertain and Yin temperament groups at the second measure

	Yang	Uncertain	Yin	total	ANOVA	Post-hoc analysis
Male						
Range	(≥30)	(24-29)	(≤23)			
N (%)	22 (24.7)	41 (46.1)	26 (29.2)	89 (100)		
SPQ	33.50 ± 2.58	26.71 ± 1.90	20.27 ± 2.27	26.51 ± 5.33	F = 217.459, df = 2,86, p < 0.05	Yang > uncertain > Yin
SPQ-B	12.86 ± 1.36	10.39 ± 1.90	7.31 ± 1.44	10.10 ± 2.63	F = 68.798, df = 2,86, p < 0.05	Yang > uncertain > Yin
SPQ-C	11.91 ± 1.66	9.27 ± 1.76	7.35 ± 1.67	9.36 ± 2.38	F = 42.486, df = 2,86, p < 0.05	Yang > uncertain > Yin
SPQ-E	8.73 ± 1.67	7.05 ± 2.07	5.62 ± 1.42	7.04 ± 2.12	F = 17.696, df = 2,86, p < 0.05	Yang > uncertain > Yin
Female						
Range	(≥31)	(25-30)	(≤24)			
N (%)	50 (31.6)	61 (38.6)	47 (29.7)	158 (100)		
SPQ	34.02 ± 2.68	27.39 ± 1.70	21.21 ± 2.16	27.65 ± 5.48	F = 417.204, df = 2,155, p < 0.05	Yang > uncertain > Yin
SPQ-B	13.04 ± 1.62	9.77 ± 1.83	7.21 ± 1.52	10.04 ± 2.84	F = 148.036, df = 2,155, p < 0.05	Yang > uncertain > Yin
SPQ-C	11.32 ± 1.85	9.26 ± 1.58	7.60 ± 1.38	9.42 ± 2.17	F = 64.921, df = 2,155, p < 0.05	Yang > uncertain > Yin
SPQ-E	9.66 ± 1.75	8.36 ± 1.85	6.40 ± 1.72	8.19 ± 2.19	F = 41.024, df = 2,155, p < 0.05	Yang > uncertain > Yin

SPQ, Sasang Personality Questionnaire; SPQ-B, SPQ-Behavior; SPQ-C, SPQ-Cognition; SPQ-E, SPQ-Emotionality.

Table 8 – Participants categorized as high, middle and low SPQ score groups in first and second measures with three months interval.

	Second measure			
	Yang	Uncertain	Yin	Total
First measure				
Male				
Yang	18	9	0	27
Uncertain	4	25	7	36
Yin	0	7	19	26
Total	22	41	26	89
Female				
Yang	39	9	0	48
Uncertain	11	42	8	61
Yin	0	10	39	49
Total	50	61	47	158

group at first and second measure was 69.7% for male and 76% for female subjects (Table 8), and none was switched between Yin and Yang temperaments. And the correlation coefficient between first and second measures of SPQ total score were 0.851 and 0.888 in males and females (Table 5). As for the test-retest validity, the correlation coefficient of SPQ total,

SPQ-B, SPQ-C and SPQ-E score with three months interval in this study were 0.877, 0.866, 0.786, and 0.772, and these were slightly higher than 0.837, 0.830, 0.798, and 0.748 of previous study⁹ with one month interval.

Though the SPQ was found to be a reliable clinical measure for biopsychological traits of Yin-Yang as shown in previous studies, there still lies limitations for generalizing results in this study. First, there was significant differences in age and SPQ-E score between male and female unlike previous studies^{14,26} showing sexual difference in SPQ-C. Further studies bearing age and sex distributions in mind are needed, since SPQ-C and SPQ-E are reported to be associated with psychopathological problems.⁷

Second, since the subjects in this study were university students recruited only in Busan metropolitan area, nationwide participants with more longer interval up-to years would be needed to examine the stability of Yin-Yang temperament.

Third, it was difficult to find proper SPQ cut-off score for Yang and uncertain temperament groups in second measure of male students (Table 7). The population of uncertain temperament group increased 11.3% when the cut-off score moved from 28 (34.8%) to 29 (46.1%), and this made temperament group clustering challenging. For this reason, the

Cohen's Kappa for male participants (0.536) was found a bit low compare to that of female participants (0.637).

As for the further study, the SPQ for measuring Yin-Yang temperament would need revision for several reasons. The width between the lowest and highest SPQ score of uncertain temperament group was 4-7 in this (Table 6) and previous^{7,18,20} studies, which is relatively small for the clinical use. The variance of SPQ score should be enlarged to provide more precise and detailed cut-off score for Yin-Yang temperament group clustering¹⁴ by adding more questionnaire items not keen to gender and age difference and introducing more than 3 point likert scale with the help of previous biopsychological studies on Yin-Yang temperament and Sasang typology.^{11,13,22,27-32} The internal consistency of SPQ subscales was relatively low and its factor loading was different even with its proven clinical usefulness, and extensive revision for improving validity might be required to be implemented in clinics.

In conclusion, this study demonstrated the repeatability of SPQ is acceptable with 247 university students in categorical and numerical aspects, and the Yin-Yang temperament stable over three months of time. The SPQ and Yin-Yang temperament might be useful for diagnosis, treatment, rehabilitation and health management of psychobiological problems in university students.^{2,6,7}

Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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