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Research paper

Is the cognitive emotion regulation strategy related to Yin-Yang personality traits?

Soo Jin Lee[a], Seung-Ryong Kim[b], Sang Yun Han[c], Yong Jae Lee[c,d], Han Chae[c,*]

[a] Department of Psychology, Kyungsung University, Busan, 48434, South Korea
[b] Department of Korean Literature in Chinese Characters, Pusan National University, Busan, 46241, South Korea
[c] School of Korean Medicine, Pusan National University, Yangsan, 50612, South Korea
[d] Pusan National University Korean Medicine Hospital, Yangsan, 50612, South Korea

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ABSTRACT

Introduction: Yin-Yang is a principal theory in East-Asian medicine for scrutinizing biopsychological predisposition and pathological susceptibility. The cognitive emotion regulation strategy governs immediate response to stressful events, and mediates the effects of personality on biopsychological health and well-being; however, its relation to Yin-Yang personality has yet to be examined.

Methods: 247 Korean university students completed the Sasang Personality Questionnaire (SPQ) for Yin-Yang personality and the Cognitive Emotion Regulation Questionnaire (CERQ). Stepwise regression analysis was employed to examine the effects of SPQ subscales on adaptive (aCERQ) and maladaptive CERQ (mCERQ) total score. Latent Profile Analysis was applied to extract hidden groups in aCERQ and mCERQ subscales, while Profile Analysis and the F-test examined differences in SPQ and CERQ subscale profiles and scores between extracted latent groups.

Results: Three SPQ subscales explained 13% and 8% of the total variance of the aCERQ and mCERQ total scores, respectively. High SPQ-Behavior and gender explained the aCERQ total score, while low SPQ-Behavior and high SPQ-Emotionality explained the mCERQ total score. There were significant differences in SPQ-Behavior and SPQ-Cognition between more and less adaptive groups, and in SPQ-Behavior and SPQ-Emotionality between less and more maladaptive groups.

Conclusions: The subscales of Yin-Yang personality was shown to explain the use of cognitive emotion regulation as individual trait and complex profile. The usefulness of Yin-Yang for improving mental health in college education were discussed.

1. Introduction

The Yin-Yang (*Eum-Yang* in Korean), which refers to opposite and complementary traits or substances such as dark-light, female-male, negative-positive and night-day [1], has long been used as the central dogma of East-Asian medical science for scrutinizing biopsychological predisposition and pathological susceptibility. The concept of Yin-Yang and its clinical knowledge have been unfairly regarded as impractical during the harsh modernization of 20 century; however, medical professionals are now paying more attention following the increasing interest on East-Asian medicine [1–4].

The Sasang Personality Questionnaire (SPQ) was recently developed as an objective clinical measure of the biopsychological domain of Yin-Yang [4,5] and consists of 3 domains; SPQ-Behavior, SPQ-Cognition, and SPQ-Emotionality. It has been validated for individuals of various ages including elementary [6], middle [7] and high [7] school students, and adults [5,8]. The psychological reliability of SPQ was repeatedly examined [2,4,5], and its close relationship with biopsychological traits [4,5], psychopathological characteristics [3,9], and physical health [5,6] were reported.

Evaluation of SPQ subscales also revealed that the psychopathological characteristics of the Achenbach System of Empirically Based Assessment (ASEBA) were positively correlated with SPQ-Emotionality and negatively correlated with SPQ-Behavior and/or SPQ-Cognition [3,9,10], while the Vitality of Short-Form 12 was positively correlated with SPQ-Behavior [11].

The psychopathological susceptibility has been known to be influenced by personality traits, and the regulation of emotion has been reported to mediate the effects of personality on mental health. The emotion regulation has been reported to be correlated with personality

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* Corresponding author.
E-mail address: han@chaelab.org (H. Chae).

[12] and to play an important role in psychological health [13–16], social functioning [17,18] and biopsychological well-being [18,19]. Cognitive emotion regulation governs stress recognition and response to it, and subsequently intensifies or dampens the influence of stress.

Cognitive emotion regulation is reportedly related to Extraversion, Neuroticism and Openness of Five Factor model, and the maladaptive domain of cognitive emotion regulation is associated with Harm-Avoidance of Temperament and Character Inventory [13,20–24]. The SPQ total score has been shown to be positively correlated with Extraversion and negatively correlated with Harm-Avoidance [3,4], while SPQ subscales have been reported to predict problem behaviors [3], which are associated with cognitive emotion regulation [13,17,25].

In this study, we examined the associations of Yin-Yang personality with the selection of automatic response style or strategy using the SPQ and Cognitive Emotion Regulation Questionnaire (CERQ) which was exploratory and not preregistered. The CERQ measures imminent response patterns in response to stressful events on a cognitive and emotional level [26,27], and examines two independent domains of adaptive (aCERQ) and maladaptive (mCERQ) strategies.

The aCERQ refers to adaptive strategies recognizing stressful events in positive ways, and has five subscales of Putting into Perspective, Refocus on Planning, Positive Refocusing, Positive Reappraisal and Acceptance. The mCERQ refers to maladaptive strategies recognizing stressful events in negative ways, and has four subscales of Rumination, Catastrophizing, Blaming Others and Blaming Self.

In this study, the relationship between Yin-Yang personality and cognitive emotion regulation was examined in Korean university students, who are currently going through a period when it is essential to establish an independent social identity outside parental guidance [6,28,29]. During this time, there might be problems in social relationships and professional efficacy, as well as negative impacts on lifelong mental health and biopsychological well-being [27,30] when response to academic and social stresses in university life is fixed in negative and maladaptive ways.

Considering previous report that SPQ total score is significantly correlated with Positive Affection, not with the Negative Affection of Positive Affection and Negative Affection Schedule (PANAS) [5], all the statistical analyses were performed with aCERQ and mCERQ separately. After examining correlation between SPQ and CERQ, stepwise regression was used to evaluate the effects of Yin-Yang personality on the use of cognitive emotion regulation strategies. Additionally, Latent Profile Analysis (LPA) was employed to extract hidden strategy profile groups using age and gender as covariates [6], while Profile Analysis and F-tests were used to examine the Yin-Yang subscale profile of each latent strategy group. The LPA focuses on homogeneity and complex interaction of variables, while extracting hidden patterns and distinctive groups inside clinical data [6,30]. Although LPA and Profile Analysis are gaining popularity in clinical data analysis and have conceptual similarity with traditional East-Asian Pattern Identification and clinical syndrome complexes, these techniques have been used in only a few integrative and traditional East-Asian medicine studies [6].

This study evaluated the relationships between Yin-Yang personality and cognitive emotion regulation with SPQ and CERQ, and investigated how to improve mental health in university students [6,28]. With these, traditional East-Asian life nurturing techniques might be incorporated as integrative clinical technique in university education [6].

2. Methods and procedures

2.1. Subjects

The participants were university students attending Korean Classics Written in Chinese Characters as a required elective class in August 2015, and no exclusion criteria were applied. The 313 participants were asked to complete Sasang Personality Questionnaire and Cognitive

Emotion Regulation Questionnaire for measuring Yin-Yang personality and cognitive emotion regulation strategy. This study acquired approval (PNU IRB/2015_59_HR) from the Institutional Review Board of Affiliated Institute, and all participants were asked to provide informed written consent when filling up required questionnaires.

2.2. Sasang Personality Questionnaire (SPQ)

The Sasang Personality Questionnaire (SPQ) [5] measures Yin-Yang temperament in three perspectives of behavioral (passive or active), cognitive (meticulous or easy-going) and emotional (static or dynamic) dimensions based on psychobiological studies of Yin-Yang and Confucianism [31]. The high SPQ score represents Yang temperament (active, easy-going and dynamic) of extroverted, sociable, careless, flexible, irritable and emotional person, and the low SPQ score denotes Yin temperament (passive, meticulous and static) of inhibited, idle, thoughtful, consistent, organized, calm and stable person. The SPQ has been reported to have clinical usefulness and psychometric validity in individuals in their 20 s to 70 s. [2–5,31]

The SPQ is a 15-item self-report questionnaire with two opposing words describing specific personality traits that requires the respondent to select one of three answers (e.g., 1 = easy-going, 2 = not sure, 3 = meticulous). The internal consistency of SPQ total, SPQ-Behavior (SPQ-B), SPQ-Cognition (SPQ-C) and SPQ-Emotionality (SPQ-E) using Cronbach's alpha were 0.722, 0.769, 0.581 and 0.641 in a previous study [31].

2.3. Cognitive Emotion Regulation Questionnaire (CERQ)

The Cognitive Emotion Regulation Questionnaire (CERQ) measures emotional regulation strategies of individuals for responding to negative life events, and analyzes its psychopathological influences in cognitive and internal perspectives [25–28,30,32,33]. Emotion regulation plays a major role in managing biopsychosocial response to stress, and has often been the subject of interest in psychological and medical studies.

The Korean version of CERQ [27], which has two scales of aCERQ and mCERQ dimensions along with nine subscales, consists of 36 self-reported items scored on a 5 point Likert scale (1 = (almost) never to 5 = (almost) always). The aCERQ (20 items, 20–100) for adaptive strategy has five subscales, putting into perspective (PIP), refocus on planning (REP), positive refocusing (PRF), positive reappraisal (PRA) and acceptance (ACC), while the mCERQ (16 items, 16–80) for maladaptive strategy has four subscales, rumination (RUM), catastrophizing (CAT), blaming others (BLO) and blaming self (BLS). The internal consistencies of PIP, REP, PRF, PRA, ACC, RUM, CAT, BLO and BLS were shown to be 0.66, 0.80, 0.85, 0.80, 0.53, 0.68, 0.78, 0.83, and 0.76 in a previous study [27].

2.4. Statistical analysis

Significant differences between male and female students in demographic features of age, school year, and subscales of SPQ and CERQ were examined with the χ^2 and *t*-tests. The correlations between subscales of SPQ and CERQ were analyzed using Pearson's correlation. Multiple stepwise regression analyses were conducted to determine how Yin-Yang temperament explains adaptive (aCERQ) and maladaptive (mCERQ) strategies of CERQ. First, age and gender were introduced (model 1), after which three subscales of SPQ were added as the final model (model 2). The inclusion criterion for entering in the model was *p* value less than 0.05 associated with the *F*-statistic.

Latent profile analysis (LPA) [6] with gender as the covariate was employed to explore the latent subgroups of cognitive emotion regulation strategies in university students [34]. The LPA is an empirically driven statistical model that unveils subgroups of people based on similar chracteristics [35] from observed continuous variables such as the

nine subscales of CERQ and estimates the probabilty any observation falls into one of the subgroups. The number of classes or subgroups is determined by comparison of posterior fit statistics. Specifically, LPA models are estimated with classes added repeatedly to determine which model has the best fit to the data until the additional one does not produce a significant improvement in the model fit statistics.

The criteria of model fit were as follows [36]: (1) a smaller Baysian Information Criterion (BIC) and adjusted BIC value indicates a better model; (2) a smaller p value associated with the Vuong-Lo-Mendell-Rubin Likelihood Difference Test (VLMR) or Lo-Mendell-Rubin Likelihood Difference Test (LMR) is associated with a better model; and (3) the Entropy index was used to examine the distinctiveness of latent classes identified, with a value > 0.8 considered good [37].

After determining the number of latent classes with LPA analysis in aCERQ and mCERQ, an F-test using age and gender as covariates was conducted to identify significant differences in subscales of SPQ and CERQ between extracted latent subgroups. The estimated mean and standard error of the SPQ and CERQ subscale scores corresponding to latent classes were presented along with significane of differences.

The data are presented as means and standard deviations or frequencies with percentages. All analyses were conducted using IBM SPSS Statistics 20.0 for Windows (IBM, Armonk, NY, USA) and MPlus 5.21 (Muthen & Muthen, Los Angeles, CA, USA) [34]. p values of 0.05, 0.01, and 0.001 were used for significance.

3. Results

3.1. Demographic features in this study

The data of 247 participants who completed both SPQ and CERQ were analyzed in the current study. There were no significant differences in school year ($\chi^2 = 2.067$, *n.s.*) between male and female students (Table 1). However, the age of male students (21.57 ± 2.2) was significantly ($t = 4.924$, $p < 0.001$) higher than that of female students (20.29 ± 1.44) since male students have to take off from school to serve their mandatory military duty.

There were no significant differences between male and female students in SPQ and its subscales, except for SPQ-E, which was higher in female students (8.19 ± 2.17) than male students (7.04 ± 2.24). There were no significant differences in mCERQ; however, subscales of aCERQ including PIP (14.58 ± 2.79 and 13.75 ± 3.05 for male and female, respectively), REP (16.15 ± 2.6 and 14.51 ± 2.92), RRF (12.75 ± 4.06 and 11.53 ± 3.87), PRA (15.39 ± 3.13 and 14.14 ± 3.61), and aCERQ total (73.72 ± 11.08 and 68.52 ± 11.42) were significantly higher in male than female students (Table 1). Since there were significant differences in age, SPQ and CERQ between male and female students, age and gender were included as covariates in statistical analysis.

The internal consistency of SPQ total, SPQ-B, SPQ-C and SPQ-E were 0.772, 0.769, 0.581, and 0.641, respectively. As for the internal consistency of nine CERQ subscales, PIP, REP, PRF, PRA, ACC, RUM, CAT, BLO, and BLS revealed Cronbach's alpha values of 0.691, 0.823, 0.882, 0.820, 0.550, 0.736, 0.789, 0.853 and 0.780, respectively.

3.2. Correlation between subscales of SPQ and CERQ

The SPQ total score was significantly correlated with that of aCERQ total ($r = 0.205$, $p < 0.01$) but not mCERQ total ($r = 0.054$, *n.s.*). There were no significant correlations ($r = -0.081$, *n.s.*) between aCERQ and mCERQ total score, suggesting that the adaptive and maladaptive emotion regulations are independent (Table 2). The aCERQ total score was significantly correlated with SPQ-B ($r = 0.280$, $p < 0.01$) and SPQ-C ($r = 0.190$, $p < 0.01$), while the mCERQ total was correlated with SPQ-E ($r = 0.241$, $p < 0.01$). Evaluation of the correlation

Table 1
Demographic features of study participants.

N		male 89 (36%)	female 158 (64%)	Total 247	
age[***]		21.57 ± 2.2	20.29 ± 1.44		t = 4.924, p < 0.001
School year					χ² = 2.067, p = 0.559
	1	31	45	76	
	2	25	47	72	
	3	19	31	50	
	4	14	35	49	
CERQ					
	aCERQ				
	Total[***]	73.72 ± 11.08	68.52 ± 11.42	70.39 ± 11.55	t = 3.472, p < 0.001
	PIP[*]	14.58 ± 2.79	13.75 ± 3.05	14.05 ± 2.98	t = 2.133, p = 0.034
	REP[***]	16.15 ± 2.6	14.51 ± 2.92	15.1 ± 2.91	t = 4.405, p < 0.001
	PRF[*]	12.75 ± 4.06	11.53 ± 3.87	11.97 ± 3.98	t = 2.35, p = 0.020
	PRA[**]	15.39 ± 3.13	14.14 ± 3.61	14.59 ± 3.49	t = 2.747, p = 0.007
	ACC	14.84 ± 2.17	14.6 ± 2.43	14.69 ± 2.34	t = 0.778, p = 0.437
	mCERQ				
	Total	44.09 ± 7.43	44.09 ± 9.81	44.09 ± 9.01	t = −0.005, p = 0.998
	RUM	13.15 ± 2.89	13.12 ± 3.57	13.13 ± 3.33	t = 0.062, p = 0.951
	CAT	8.98 ± 3.34	9.21 ± 3.73	9.13 ± 3.59	t = −0.486, p = 0.628
	BLO	8.64 ± 2.79	9.13 ± 3.36	8.95 ± 3.17	t = −1.159, p = 0.248
	BLS	13.33 ± 3.02	12.64 ± 3.21	12.89 ± 3.16	t = 1.646, p = 0.101
SPQ					
	SPQ total	26.54 ± 5.38	27.8 ± 5.55	27.34 ± 5.51	t = −1.729, p = 0.085
	SPQ Behavior	10.02 ± 2.86	10.22 ± 2.82	10.15 ± 2.83	t = −0.53, p = 0.597
	SPQ Cognition	9.47 ± 2.21	9.39 ± 2.38	9.42 ± 2.32	t = 0.279, p = 0.781
	SPQ Emotionality[***]	7.04 ± 2.24	8.19 ± 2.17	7.78 ± 2.25	t = −3.943, p < 0.001

CERQ, Cognitive Emotion Regulation Questionnaire; aCERQ, adaptive perspectives of CERQ; mCERQ, mal-adaptive perspectives of CERQ; PIP, putting in perspective; REP, refocus on planning; PRF, positive refocusing; PRA, positive reappraisal; ACC, acceptance; RUM, rumination; CAT, catastrophizing; BLO, blaming others; BLS, blaming self; SPQ, Sasang Personality Questionnaire.

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

Table 2

Correlation coefficients between SPQ and CERQ subscales.

	aCERQ						mCERQ				
	PIP	REP	PRF	PRA	ACC	total	RUM	CAT	BLO	BLS	total
SPQ total	.149[*]	.110	.173[**]	.171[**]	.136[*]	.205[**]	.073	−.050	.027	.105	.054
SPQ Behavior	.214[**]	.239[**]	.230[**]	.221[**]	.091	.280[**]	−.028	−.187[**]	−.024	.060	−.072
SPQ Cognition	.162[*]	.107	.149[*]	.128[*]	.154[*]	.190[**]	−.043	−.062	.001	.061	−.019
SPQ Emotionality	−.071	−.140[*]	−.021	.011	.061	−.045	.258[**]	.177[**]	.096	.119	.241[**]

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

SPQ, Sasang Personality Questionnaire; CERQ, Cognitive Emotion Regulation Questionnaire; aCERQ, adaptive perspectives of CERQ; mCERQ, mal-adaptive perspectives of CERQ; PIP, putting in perspective; REP, refocus on planning; PRF, positive refocusing; PRA, positive reappraisal; ACC, acceptance; RUM, rumination; CAT, catastrophizing; BLO, blaming others; BLS, blaming self.

between CERQ subscales revealed that maladaptive CAT was negatively correlated with adaptive PIP ($r = -0.263$, $p < 0.001$), PRF ($r = -0.261$, $p < 0.001$), PRA ($r = -0.286$, $p < 0.001$), and aCERQ total ($r = -0.286$, $p < 0.001$). Additionally, adaptive ACC was positively correlated with maladaptive RUM ($r = 0.240$, $p < 0.001$) and BLS ($r = 0.324$, $p < 0.001$).

3.3. Stepwise regression analysis of aCERQ and mCERQ with subscales of SPQ

Regression analysis provided an acceptable regression model that explained noticeable amount of variances of SPQ subscales using age and gender as covariates (Table 3).

The regression model (R^2 ($adj.R^2$) = 0.130 (0.122), $F = 18.162$, $p < 0.001$) with subscales of SPQ explained 13.0% of the total variance in aCERQ total score. Moreover, the aCERQ total score was increased with increased SPQ-B score and among males. The regression model (R^2 ($adj.R^2$) = 0.081 (0.074), $F = 10.785$, $p < 0.001$) with subscales of SPQ explained 8.1% of total variance in mCERQ total score, and the mCERQ total score was increased with high SPQ-E and low SPQ-B scores.

3.4. Latent profiles in aCERQ and mCERQ subscales

There were two latent emotion regulation strategy groups for aCERQ and mCERQ subscales (Tables 4 and 5, respectively).

As shown in Table 4, the two latent class model showed acceptable BIC (7479.332), adj. BIC (7427.592), VLMRp (0.0007), LMRp (0.0008), BLRTp (< 0.0001) and Entropy (0.736) for aCERQ. The less adaptive latent group of low aCERQ subscales consisted of 128 (51.82%)

Table 3

Stepwise regression analysis of aCERQ and mCERQ total score with three SPQ subscales, age and gender.

	Unstandardized Coefficients		Standardized Coefficients	t	P
	B	SE	β		
aCERQ total score					
gender***	−5.434	1.435	−0.226	−3.787	< 0.001
SPQ Behavior***	1.174	0.244	0.288	4.814	< 0.001
	R^2(adj.R^2) = 0.130(0.122), $F = 18.162$, $p < 0.001$				
mCERQ total score					
SPQ Emotionality***	1.154	0.257	0.289	4.492	< 0.001
SPQ Behavior*	−0.505	0.205	−0.159	−2.469	0.014
	R^2(adj.R^2) = 0.081(0.074), $F = 10.785$, $p < 0.001$				

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

CERQ, Cognitive Emotion Regulation Questionnaire; aCERQ, adaptive perspectives of CERQ; mCERQ, mal-adaptive perspectives of CERQ; SPQ, Sasang Personality Questionnaire.

Table 4

Latent Profile Analysis results on five aCERQ subscales.

Model	BIC	adj.BIC	VLMRp	LMRp	BLRTp	Entropy
2 class	**7497.332**	**7427.592**	**0.0007**	**0.0008**	**0.0000**	**0.736**
3 class	7443.799	7348.699	0.0499	0.0528	0.0000	0.799
4 class	7460.026	7339.566	0.1508	0.1560	0.0128	0.837
5 class	7485.421	7339.602	0.6743	0.6779	0.5000	0.852

aCERQ, adaptive perspectives of Cognitive Emotion Regulation Questionnaire; BIC, Bayesian Information Criteria; adj.BIC, Sample-Size Adjusted BIC; VLMRp, Vuong-Lo-Mendell-Rubin Likelihood Ratio test p-value; LMRp, Lo-Mendell-Rubin Adjusted LRT p-value; BLRTp, Parametric Bootstrapped Likelihood Ratio p-value.

Table 5

Latent Profile Analysis results on four mCERQ subscales.

Model	BIC	adj.BIC	VLMRp	LMRp	BLRTp	Entropy
2 class	**6490.027**	**6429.797**	**0.0011**	**0.0013**	**0.0000**	**0.700**
3 class	6521.712	6439.292	0.2064	0.2164	1.0000	0.804
4 class	6491.928	6387.319	0.5961	0.6018	0.0000	0.751
5 class	6508.703	6381.904	1.0000	1.0000	0.2381	0.736

mCERQ, maladaptive perspectives of Cognitive Emotion Regulation Questionnaire; BIC, Bayesian Information Criteria; adj.BIC, Sample-Size Adjusted BIC; VLMRp, Vuong-Lo-Mendell-Rubin Likelihood Ratio test p-value; LMRp, Lo-Mendell-Rubin Adjusted LRT p-value; BLRTp, Parametric Bootstrapped Likelihood Ratio p-value.

participants, while the more adaptive latent group of high aCERQ subscales consisted of 119 (48.18%) participants (Table 6).

For mCERQ, the two latent class model showed acceptable BIC (6490.027), adj.BIC (6427.797), VLMRp (0.0011), LMRp (0.0013), BLRTp (< 0.0001) and Entropy (0.700) in this study (Table 5). The less maladaptive latent group of low mCERQ subscales consisted of 157 (63.56%) participants, while the more maladaptive latent group of high mCERQ subscales consisted of 90 (36.44%) participants (Table 7).

3.5. SPQ and CERQ subscales of latent strategy groups in aCERQ and mCERQ

The estimated scores of SPQ and CERQ subscales of four latent CERQ groups were shown in Tables 6 and 7. Significant differences in SPQ and CERQ subscales between low and high CERQ latent groups were identified by F-tests using gender and age as covariates.

The more and less adaptive groups found in aCERQ subscales had significantly different SPQ subscale scores. The more adaptive group had significantly higher SPQ-B (10.72 ± 0.26 and 9.62 ± 0.25) and higher SPQ-C (9.86 ± 0.21 and 9.01 ± 0.21 for more and less adaptive groups, respectively) scores than the less adaptive group (Table 6).

The less and more maladaptive groups found in mCERQ subscales had significantly different SPQ subscale scores. Specifically, the less maladaptive group had a significantly higher SPQ-B (10.49 ± 0.22 and

Table 6
Estimated SPQ and aCERQ subscale scores of two latent groups in aCERQ considering age and gender.

N	Less adaptive (low aCERQ) 128 (51.82%)	More adaptive (high aCERQ) 119 (48.18%)	
aCERQ			
total***	61.71 ± 0.64	79.74 ± 0.66	F = 371.576, p < 0.001
PIP***	12.39 ± 0.22	15.83 ± 0.23	F = 114.469, p < 0.001
REP***	13.69 ± 0.22	16.61 ± 0.23	F = 82.613, p < 0.001
PRF***	9.99 ± 0.31	14.09 ± 0.32	F = 83.02, p < 0.001
PRA***	12.15 ± 0.22	17.22 ± 0.22	F = 257.197, p < 0.001
ACC***	13.48 ± 0.18	15.99 ± 0.19	F = 89.522, p < 0.001
SPQ			
total**	26.39 ± 0.49	28.37 ± 0.51	F = 7.636, p = 0.0062
SPQ Behavior**	9.62 ± 0.25	10.72 ± 0.26	F = 8.86, p = 0.0032
SPQ Cognition**	9.01 ± 0.21	9.86 ± 0.21	F = 7.902, p = 0.0053
SPQ Emotionality	7.76 ± 0.20	7.79 ± 0.21	F = 0.01, p = 0.9199

*, p < 0.05; **, p < 0.01; ***, p < 0.001.
CERQ, Cognitive Emotion Regulation Questionnaire; aCERQ, adaptive perspectives of CERQ; PIP, putting in perspective; REP, refocus on planning; PRF, positive refocusing; PRA, positive reappraisal; ACC, acceptance; SPQ, Sasang Personality Questionnaire.

9.56 ± 0.3) and lower SPQ-E (7.51 ± 0.17 and 8.24 ± 0.23 for less and more maladaptive groups, respectively) score than the more maladaptive group (Table 7).

4. Discussion

This study examined the influence of Yin-Yang personality on the use of the cognitive emotion regulation strategy in 247 Korean university students using subscales of SPQ and CERQ. Stepwise regression and LPA were used to determine how SPQ subscales explain the use of emotion regulation style as individual traits and complex profiles. The results revealed that Yin-Yang personality might determine the use of emotion regulation strategy after experiencing stressful events, especially SPQ-B and SPQ-E in positive and negative ways, respectively.

Evaluation of demographic features revealed that female students had lower age and higher SPQ-E score than male students (Table 1). Female students also showed lower PIP, REP, PRF and PRA subscale scores along with a lower aCERQ total score than those of male students. Considering that female students frequently used maladaptive

strategies [38] including Rumination and Catastrophizing [39], investigations on the correlation between gender and the use of negative (less adaptive and more maladaptive) strategy would be needed.

The correlations between subscales of CERQ and SPQ (Table 2) revealed that aCERQ total score was positively correlated with SPQ total, SPQ-B, and SPQ-C scores, while the mCERQ total score was positively correlated with the SPQ-E score. Stepwise regression also showed that being male and a high SPQ-B explained aCERQ total score, while high SPQ-E and low SPQ-B explained mCERQ total score (Table 3). These results are concordant with those of previous studies that problem behavior was positively correlated with SPQ-E and negatively correlated with SPQ-B [3,9] and the Short-Form 12 Vitality scale evaluating the degree of energy for a month was positively correlated with SPQ-B [11]. Interestingly, aCERQ is positively correlated with SPQ-B along with SPQ total, and mCERQ is positively correlated with SPQ-E but not with SPQ total. This might be compared to previous report that Positive Affection is positively correlated with SPQ-B and SPQ total, and Negative Affection is positively correlated with SPQ-E but not with SPQ total [5].

The Yin-Yang personality might have long-term effects on development of emotion regulation scheme of a person [26], which could result in establishing long-term disease susceptibility, biopsychological health and well-being of a person. For these reason, LPA that can perform person-centered analysis on complex non-linear interactions of psychological characteristics in clinical settings was incorporated in this study [6,30,40,41].

Hidden profile groups were extracted from adaptive and maladaptive CERQ subscales using LPA (Tables 4 and 5), and two latent groups from adaptive and maladaptive strategies were found. The more adaptive strategy group had higher SPQ-B and SPQ-C scores than the less adaptive strategy group, while the less maladaptive strategy group had higher SPQ-B and lower SPQ-E scores than the more maladaptive strategy group (Tables 6 and 7). These results suggest that Yin-Yang personality subscales influence the selection of cognitive response style to stressful situations and consequently determine the biopsychological [42] and psychopathological [3,9,43] characteristics.

The effects of SPQ subscales [2–5,31] on adaptive and maladaptive CERQ subscales [25,26,32,44] might be explained as follows. The aCERQ refers to the use of adaptive emotion regulation strategy to stressful or threatening events, and has subscales of acceptance, putting in perspective, positive reappraisal and refocusing, and positive refocus on planning. A person with a high aCERQ total score accepts the events as they are without exaggerating their seriousness, creates a positive meaning for personal growth, and focuses on planning how to handle negative events [26].

A high aCERQ total score is correlated with high scores of SPQ-B

Table 7
Estimated SPQ and mCERQ subscale scores of two latent groups in mCERQ considering age and gender.

N		Less maladaptive (low mCERQ) 157 (63.56%)	More maladaptive (high mCERQ) 90 (36.44%)	
mCERQ				
	total***	38.95 ± 0.48	53.06 ± 0.63	F = 315.554, p < 0.001
	RUM***	11.94 ± 0.24	15.20 ± 0.31	F = 68.306, p < 0.001
	CAT***	6.98 ± 0.18	12.87 ± 0.23	F = 402.639, p < 0.001
	BLO***	7.66 ± 0.21	11.20 ± 0.28	F = 98.99, p < 0.001
	BLS***	12.37 ± 0.25	13.79 ± 0.33	F = 11.951, p < 0.001
SPQ				
	total	27.59 ± 0.44	26.92 ± 0.58	F = 0.851, p = 0.3571
	SPQ Behavior*	10.49 ± 0.22	9.56 ± 0.30	F = 6.176, p = 0.0136
	SPQ Cognition	9.59 ± 0.19	9.11 ± 0.25	F = 2.439, p = 0.1196
	SPQ Emotionality*	7.51 ± 0.17	8.24 ± 0.23	F = 6.509, p = 0.0113

*, p < 0.05; **, p < 0.01; ***, p < 0.001.
CERQ, Cognitive Emotion Regulation Questionnaire; mCERQ, mal-adaptive perspectives of CERQ; RUM, rumination; CAT, catastrophizing; BLO, blaming others; BLS, blaming self; SPQ, Sasang Personality Questionnaire.

and SPQ-C, which might imply action- and/or task-focused confrontation to the problem after recognizing the status as optimistic [26]. A person with high SPQ-B score has extroverted, sociable, active, industrious and energetic behavioral attitudes [11], while a person with high SPQ-C score has an easy-going, straightforward, optimistic, flexible and careless cognitive style [5,31].

The mCERQ denotes the use of maladaptive emotion regulation strategy to stressful or threatening events, and has subscales of rumination, catastrophizing, and blaming others and themselves. A person with high mCERQ total score emphasizes the negative aspects of experiences, focuses on the associated feelings or thoughts associated with negative events, and puts the blame for negative events on the environment, other individuals and themselves [26].

A high mCERQ total score is correlated with high SPQ-E and low SPQ-B score, which imply the negative evaluation of current status and lack of self-directed responses to it. A person with low SPQ-B score has introverted, inactive, asocial, inhibited, idle and passive behavioral attitudes, while a person with high SPQ-E score has affective, unstable, irritable, intolerant and pessimistic emotional responses [5,31].

Previous and current studies showed that the SPQ-E is a psychopathological risk factor [3] that might imply vulnerability to emotional problems [44]; however, the operational definition of SPQ-E was suggested as 'high mobility of emotionality' not as 'anxiety' from the view of western medicine [4]. As for the psychopathological perspectives, the SPQ-E might be regarded as an 'inconsiderate emotional response to events and environments lacking cognitive governance'.

The concept of Yin-Yang has been used to explain pathophysiological predisposition in East-Asian medical science for thousands of years as we know. Recently, it was reported from biopsychological perspectives that Yang (*Yang* in Korean) is an inclination for behavioral activation, response to rewards, approach to novel things, and concern for outside goals, while Yin (*Eum* in Korean) is a tendency for maintaining oneself and modification of behaviors to opposite direction in order to avoid negative or uncertain events irrespective of emotional instability [1,3,4].

From the investigation on three subscales of Yin-Yang personality [5,31], we found that the SPQ-B stimulates the use of adaptive strategy and suppresses the use of maladaptive strategy, while the SPQ-E works as a psychopathological risk factor by amplifying negative emotional responses. A theoretical framework for understanding traditional East-Asian life-nurturing techniques promoting mental hygiene might be provided with this study. However, clinical studies analyzing the effects of traditional East-Asian meditation, education of classics, Qigong practice, martial arts and other character development programs for elevating SPQ-B score and lowering SPQ-E score are needed [28,45].

It should be noted that there are several issues and limitations to be tackled before generalizing the findings of this study. First, there were gender differences in SPQ and CERQ subscales, which were included as covariates in the statistical analysis. Because demographic features might vary depending on ethnic and cultural backgrounds and influencing CERQ and SPQ as suggested in previous and current studies [2,4,5,38,39], the results presented herein should be reexamined in other countries than East-Asian nations.

Second, the validity of SPQ and its subscale should be investigated in further studies [31]. Although the validity, stability and clinical usefulness of SPQ total score measuring Yin-Yang personality was repeatedly provided [2,4,5], limited number of investigations on the definition and clinical implications of its subscale scores were reported till now.

Third, the current study examined the relationship between Yin-Yang personality and cognitive emotion regulation strategy, and there is a need for study confirming the causal effects of Yin-Yang personality traits on cognitive regulation of emotion.

In the present study, subscales of Yin-Yang personality were found to be correlated with emotion regulation, which might prime psychopathological susceptibility. With further studies, Yin-Yang may regain proper recognition as a major principle of traditional East-Asian biopsychology [1] and reveal clinical value in contemporary clinical psychology [45].

Authors

All research done by the authors.

Conflict of interest

The authors declare there are no conflicts of interest.

References

[1] H. Chae, The multidisciplinary study on Sasang typology, Integr. Med. Res. 4 (1) (2015) 1–3.

[2] B.K. Hwang, Y.J. Yoon, S.Y. Han, S.J. Lee, H. Chae, Validity of Yin-Yang temperament in Sasang Personality Questionnaire, Integr. Med. Res. 7 (1) (2018) 77–84.

[3] S.J. Lee, S.Y. Han, H.Y. Kim, M.H. Choi, H. Chae, Yin-Yang temperament and psychopathological behavior in middle school students, J. Orient. Neuropsychiatry 28 (2) (2017) 61–72.

[4] S.J. Lee, S.H. Park, H. Chae, Biopsychological structure of Yin-Yang using Cloninger's Temperament model and Carver and White's BIS/BAS scale, PeerJ 4 (2016) e2021.

[5] H. Chae, S.-J. Lee, S.-H. Park, E.-S. Jang, S.-W. Lee, Validation of Sasang Personality Questionnaire (SPQ) with positive and negative affection schedule and body mass index, J. Sasang Const. Med. 24 (2) (2012) 39–46.

[6] S.J. Lee, M.H. Choi, H. Chae, Biopsychological structure of the Sasang Personality Questionnaire in elementary school students, J. Pediatr. Korean Med. 13 (1) (2017) 12–24.

[7] S.J. Lee, S.Y. Han, Y.-J. Lee, Y.-S. Ko, N. Bae, J. Cheon, H. Chae, Validation of the Sasang Personality Questionnaire in high school students, Integr. Med. Res. 5 (4) (2016) 259–266.

[8] H. Chae, Y. Kown, Best-fit index for describing physical perspectives in Sasang typology, Integr. Med. Res. 4 (1) (2015) 20–28.

[9] M.H. Choi, H. Chae, S.J. Lee, Analysis of the association between problem behaviors and Sasang typology in high school students, Integr. Med. Res. 5 (2) (2016) 110–117.

[10] S.J. Lee, Y. Sim, H.J. Kim, H.J. Kim, M.G. Kim, K.S. Kim, H. Chae, Analysis of Child Behavior Checklist (CBCL) problem behaviors of Sasang types in a child clinical sample, J. Pediatr. Korean Med. 27 (1) (2013) 7–14.

[11] S.J. Lee, S.H. Park, C.R. Cloninger, Y.H. Kim, M. Hwang, H. Chae, Biopsychological traits of Sasang typology based on Sasang personality questionnaire and body mass index, BMC Complement. Altern. Med. 14 (2014) 315.

[12] M. Kokkonen, L. Pulkkinen, Extraversion and Neuroticism as antecedents of emotion regulation and dysregulation in adulthood, Eur. J. Pers. 15 (6) (2001) 407–424.

[13] A. Aldao, S. Nolen-Hoeksema, S. Schweizer, Emotion-regulation strategies across psychopathology: a meta-analytic review, Clin. Psychol. Rev. 30 (2) (2010) 217–237.

[14] E.-H. Jo, Y.-S. Lee, The relation between the meaning in life and savoring beliefs, ways of savoring in older adults: the mediating effect of cognitive emotion regulation strategies, J. Rehabil. Psychol. 20 (3) (2013) 565–585.

[15] S. Potthoff, N. Garnefski, M. Miklósi, A. Ubbiali, F.J. Domínguez-Sánchez, E.C. Martins, M. Witthöft, V. Kraaij, Cognitive emotion regulation and psychopathology across cultures: a comparison between six European countries, Pers. Individ. Dif. 98 (2016) 218–224.

[16] J.H. Seol, S.H. Park, The effect of stress and cognitive emotion regulation strategies on psychological health problems in korean navy personnel: the moderated mediating effect of perceived social support, Korean J. Clin. Psychol. 34 (2) (2015) 553–578.

[17] A.M. Mihalca, Y. Tarnavska, Cognitive emotion regulation strategies and social functioning in adolescents, Procedia Soc. Behav. Sci. 82 (2013) 574–579.

[18] D. Cicchetti, B.P. Ackerman, C.E. Izard, Emotions and emotion regulation in developmental psychopathology, Dev. Psychopathol. 7 (1) (1995) 1–10.

[19] J.J. Gross, O.P. John, Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being, J. Pers. Soc. Psychol. 85 (2) (2003) 348–362.

[20] S. Izadpanah, M. Schumacher, E.A. Arens, M. Stopsack, I. Ulrich, M. Hansenne, H.J. Grabe, S. Barnow, Adolescent harm avoidance as a longitudinal predictor of maladaptive cognitive emotion regulation in adulthood: the mediating role of inhibitory control, J. Adolesc. 52 (2016) 49–59.

[21] C. Manfredi, G. Caselli, F. Rovetto, D. Rebecchi, G.M. Ruggiero, S. Sassaroli, M.M. Spada, Temperament and parental styles as predictors of ruminative brooding and worry, Pers. Individ. Dif. 50 (2) (2011) 186–191.

[22] L.R. Schreiber, J.E. Grant, B.L. Odlaug, Emotion regulation and impulsivity in young adults, J. Psychiatr. Res. 46 (5) (2012) 651–658.

[23] S. Ball, J. Smolin, A. Shekhar, A psychobiological approach to personality: examination within anxious outpatients, J. Psychiatr. Res. 36 (2) (2002) 97–103.

[24] A.R. Peirson, J.W. Heuchert, The relationship between personality and mood: comparison of the BDI and the TCI, Pers. Individ. Dif. 30 (3) (2001) 391–399.

[25] N. Garnefski, V. Kraaij, The Cognitive Emotion Regulation Questionnaire: psychometric features and prospective relationships with depression and anxiety in adults, Eur. J. Psychol. Assess. 23 (3) (2007) 141–149.

[26] N. Garnefski, V. Kraaij, P. Spinhoven, Negative life events, cognitive emotion regulation and emotional problems, Pers. Individ. Dif. 30 (8) (2001) 1311–1327.

[27] S. Kim, A study on relationships among the stressful events, cognitive emotion regulation strategies and psycholocal well-being, J. Stud. Guidance Couns. 26 (26) (2008) 5–29.

[28] S.-R. Kim, H. Chae, M.-K. Lee, Study on the character development by educating traditional classics, J. Sokdang Acad. Res. Tradit. Cult. 67 (2017) 119–150.

[29] S.H. Kim, S.Y. Han, J.D. Kim, S. Choi, S.J. Lee, J.H. Lim, H. Chae, Study on stress and burnout in medical education at the school of Korean medicine, J. Orient. Neuropsychiatry 26 (2) (2015) 103–116.

[30] H.N. Ahn, N.B. Lee, H.S. Joo, Validation of the cognitive emotion regulation questionnaire in a Korean population, Korean J. Couns. Psychother. 14 (3) (2013) 1773–1794.

[31] H. Chae, S. Lee, S.H. Park, E. Jang, S.-J. Lee, Development and validation of a personality assessment instrument for traditional Korean medicine: Sasang personality questionnaire, Evid. Complement. Alternat. Med. 2012 (2012) 657013.

[32] N. Garnefski, J. Teerds, V. Kraaij, J. Legerstee, T. van den Kommer, Cognitive emotion regulation strategies and depressive symptoms: differences between males and females, Pers. Individ. Dif. 36 (2) (2004) 267–276.

[33] S.Y. Hong, The effects of covert narcissism on interpersonal problems of undergraduate students: the mediation effectiveness of cognitive emotional regulation, Korean J. Youth Stud. 21 (12) (2014) 73–95.

[34] L.K. Muthén, B.O. Muthén, Mplus: Statistical Analysis with Latent Variables: User's Guide, Muthén & Muthén, Los Angeles, 2005.

[35] S.T. Lanza, B.P. Flaherty, L.M. Collins, Latent class and latent transition analysis, in: J. Schinka, W.A. Velicer (Eds.), Handbook of Psychology: Research Methods in Psychology, Wiley, New York, NY, 2003, pp. 663–685.

[36] K.L. Nylund, T. Asparouhov, B.O. Muthen, Deciding on the number of classes in latent class analysis and growth mixture modeling: a Monte Carlo simulation study, Struct. Equation Model. 14 (4) (2007) 535–569.

[37] B. Muthén, Latent variable analysis : growth mixture modeling and related techniques for longitudinal data, in: D. Kaplan (Ed.), Handbook of Quantitative Methodology for the Social Sciences, Sage Publications, Newbury Park, CA, 2004.

[38] K.R. Zlomke, K.S. Hahn, Cognitive emotion regulation strategies: gender differences and associations to worry, Pers. Individ. Dif. 48 (4) (2010) 408–413.

[39] R.C. Martin, E.R. Dahlen, Cognitive emotion regulation in the prediction of depression, anxiety, stress, and anger, Pers. Individ. Dif. 39 (7) (2005) 1249–1260.

[40] D.S. Eley, J. Leung, B.A. Hong, K.M. Cloninger, C.R. Cloninger, Identifying the dominant personality profiles in medical students: implications for their well-being and resilience, PLoS One 11 (8) (2016) e0160028.

[41] S.J. Lee, Y.J. Choi, H. Chae, The effects of personality traits on academic burnout in Korean medical students, Integr. Med. Res. 6 (2) (2017) 207–213.

[42] H. Chae, S.H. Kim, S.Y. Han, S.J. Lee, B. Kim, Y. Kwon, S.J. Lee, Study on the psychobiological characteristics of Sasang typology based on the type-specific pathophysiological digestive symptom, Korean J. Orient. Physiol. Pathol. 28 (4) (2014) 417–424.

[43] H. Chae, Y.H. Kim, S.H. Park, E.H. Hwang, Y. Kwon, S.J. Lee, Study on the effects of Sasang psychobiological factors on general health status, Korean J. Orient. Physiol. Pathol. 28 (4) (2014) 452–459.

[44] N. Garnefski, V. Kraaij, Relationships between cognitive emotion regulation strategies and depressive symptoms: a comparative study of five specific samples, Pers. Individ. Dif. 40 (8) (2006) 1659–1669.

[45] S.J. Lee, C.R. Cloninger, K.M. Cloninger, H. Chae, The temperament and character inventory for integrative medicine, J. Orient. Neuropsychiatry 25 (3) (2014) 213–224.