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The Effect of Compartmentalization of Self-concept on Depression

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This study aimed to investigate the effect of compartmentalizing self-concept on depression. For this purpose, a three-way interaction of compartmentalization, differential importance_revised (DI_R), and proportion of negative attributes_revised (Neg_R) was examined. Depression (CES-D) and self-concept structure (S-SAT) were measured in 292 college students. Analyses of the data showed that compartmentalization and DI_R had a main effect when Neg_R was low. The more compartmentalized, the more depressed and the more important the negative aspect, the more depressed. However, when Neg_R was high, there was an interaction effect between compartmentalization and DI_R. Depression levels were higher in the positive compartmentalization group than in the positive integrated group. However, there was no significant difference between the negative compartmentalization and integration groups. These results suggest that positive compartmentalization may be associated with vulnerability to depression, and that integration may not always be associated with depression reduction. Finally, the clinical implications and limitations of the study are discussed.

Keywords: compartmentalization, integration, self-concept, depression

Introduction

The cognitive therapy theory of depression emphasizes the role of negative self-concept. However, the negative self-concept of oneself alone seems to have limitations interms of understanding depression. For instance, depressed individuals perceived positive and negative contents when they thought of a specific self-aspect, but they experienced internal conflicts because they could not integrate them properly (Montesano et al., 2017). In other studies, although depression groups perceived less positive content than anxiety groups, patients with depression perceived more positive content than negative content (Dozois & Dobson, 2001; Dozois & Frewen, 2006). These results suggest that even individuals with depression do not lack positive concepts. Rather, it can be understood that problems arise because positive and negative content is not well integrated into depressive self-concepts. In sum, not only the self-concept content, but also the self-concept structure, that is, the method of organizing the positive and negative contents of the self-concept, affects depression. This study attempts to explain the characteristics of depression by focusing on compartmentalization (Showers, 1992), the structural variable of self-concept.

Compartmentalization theory assumes that self-concept consists of a multi-dimensional structure. People can show various self-aspects through situations, roles, and others, and some of these may be more important, unimportant, positive, or negative. Compartmentalization refers to the tendency to organize one aspect centered on positive content and the other on negative content when describing one's self-aspect (Showers, 1992). People with

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a high level of compartmentalization process their self-concepts as either positive or negative (*e.g., I am friendly and warm as a friend, but I am indifferent and cold as a daughter or son*). Those with a low level of compartmentalization are referred to as integrated. In this case, it is assumed that positive or negative content is comprehensively recognized (*e.g., as a lover, I am adorable, warm, but also careless*).

The results of self-evaluation vary depending on the differential importance of compartmentalization, which is an indicator of which aspect of oneself is more important and often recalled, positive or negative (Pelham & Swann, 1989). If the level of differential importance is high, the positive aspect is recognized as more important, and if it is low, the negative aspects are relatively more important. People with low compartmentalization levels can make realistic judgments by looking at both positive and negative aspects through integrated thinking; however, those with high compartmentalization levels such as negative compartmentalization can become immersed in negative thoughts and moods and become depressed (Dalgleish et al., 2011; Showers & Kling, 1996).

Interestingly, when a person with a high level of compartmentalization emphasizes only the positive aspect, it is called positive compartmentalization. In early studies, individuals who were not depressed were considered to maintain high self-esteem only when recognizing their strengths, such as positive compartmentalization. However, recent studies suggest that there is a hidden vulnerability in positive compartmentalization (Showers & Zeigler-Hill, 2007). Individuals who adopt positive compartmentalization can maintain a positive mood through defensive denial, but because of their unstable self-esteem, they can respond emotionally to minor stimuli and experience an increment in their emotional change (Ditzfeld & Showers, 2011; Thomas et al., 2013). Specifically, while negatively compartmentalized self-concept consistently predicts the worsening of depression, positive compartmentalization may or may not alleviate it.

The vulnerability of positive compartmentalization to depression has been unclear in previous studies (Bang, 2019; Kim, 2020; You & Lee, 2013). A possible explanation may be that existing studies emphasized only the structure of self-concept, such as compartmentalization, and considered the content of self-concept less. Specifically, previous studies have focused on ways to organize self-concept contents. However, to explore the vulnerability of positive compartmentalization of depression, it is necessary to analyze the frequency of positive or negative contents together, unlike previous studies. Individuals who adopt positive compartmentalization can maintain a positive mood while denying defensively when there is little negative content (Thomas et al., 2013). However, when the amount of negative self-content increases, defensive denial through positive compartmentalization will no longer work, and they would become more depressed.

Negative contents of self-concept is measured through the proportion of negative attributes (Showers, 1992). In previous studies, this proportion increased as the level of negative life events increased, and compartmentalization was related to coping methods with negative contents (Showers et al., 1998). This result suggests that there is a personal difference in the structural and content elements of self-concept and that it is necessary to explore how to organize self-concept contents as well as whether this content is positive or negative. Therefore, this study aimed to examine whether the proportion of negative attributes has a moderating effect on the process of compartmentalization and differential importance on depression.

Additionally, it is necessary to review the calculation method for the differential importance and proportion of negative attributes. Differential importance is calculated as the correlation coefficient between "valence", which is the value obtained by subtracting the negativity from positivity, and "importance" of each aspect. If the valence or importance value is fixed with a specific constant, there is no change and the correlation coefficient is not calculated. In addition, when individuals think of the self-aspect, they may think that the aspect is important to themselves, although it is negative. In this case, there is a positive correlation between valence and importance, and it is misclassified as positive compartmentalization or integration. To solve this problem, the calculation method based on the correlation coefficient must be modified (Bang, 2019; Kim, 2020).

The proportion of negative attributes was calculated as the total proportion of negative words among all words used in the card-sorting task. The calculation method assumes that the self-concept is a single dimension. Hence, the proportion of negative words included differently for each self-aspect was not considered. Howev-

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er, among self-aspects, there may be especially vulnerable aspects.

To reflect such unique characteristics, it is necessary to examine how the importance value of negative contents in each self-aspect affects the self-structure. Therefore, this study modifies the calculation method of differential importance and proportion of negative attributes and examine whether predictive variables affect depression. It was expected that positive compartmentalization would contribute to a decrease in depression when there were few negative contents. However, when negative content increases, depressionis expected to increase.

Methods

Participants

After obtaining approval from the Institutional Review Board of The Catholic University of Korea, 301 undergraduate and graduate students participated in an online survey. Among them, two who submitted the same data in duplicate, two who disagreed to participate in the study, and five who responded insincerely were excluded. Finally, 292 data points were included in the analysis, 19.5% were male (n = 57) and 80.5% were female (n = 235). The age of the participants was 21.06 (SD = 2.56). Before the survey, the participants were informed of the purpose of the study.

Measurements

Short version of Self Aspect Test (S–SAT)

The Self-Aspect Test is a modified paper-pencil version of the card-sorting task (Hwang, 2007). In this study the short version of the Self-Aspect Test (S-SAT) was used. The amendments are as follows: First, S-SAT presents six self-aspects that college students usually think in advance (*"Me when I am": a student, with friends, with family, at work, in a relationship [having a crush on someone], alone*). In the card sorting task (Linville, 1987; Showers, 1992), participants can freely think about their own aspects before writing, and in the Self-Aspect Test (Hwang, 2007), up to 11 self-aspects can be freely described. However, the results of these existing tests can vary depending on what the students think and write.

Six self-aspect categories were selected based on the frequency of self-aspect categories reported in previous studies (You & Lee, 2013, 2020). This is also because the average number of self-aspects reported by participants in card sorting tasks was 5.6–6.4 in previous studies (Showers, 1992; Showers & Kling, 1996; Zeigler-Hill & Showers, 2007).

Second, the number of words used in self-aspect descriptions was reduced from 40 to 26 per aspect. The most frequently used 13 positive (e.g., affectionate) and 13 negative (e.g., oversensitive) words in previous studies were selected (You & Lee, 2013, 2020). Instead of reducing the number of words, the words used were O-marked, and the words that were not used were X-marked. This was done to check whether the participants read all the words individually and answered faithfully.

The task progression method was the same, and the importance, positivity, and negativity of each aspect were evaluated on a 7-point scale. In this study, variables made in this study (DI_R, Neg_R) were used for analysis along with variables that have been widely used (Phi, DI, Neg). Table 1 is an actual example of a pilot study and has been added to explain the variables.

Table 1. *Example of Phi, DI and Symptom Scores Through Actual Card Sorting Task*

Me when I am..	Phi		DI		
	Positive word number	Negative word number	Importance	Positivity	Negativity
1) A student	2	12	6	2	6
2) With friends	1	13	5	2	6
3) With family	3	12	5	2	6
4) At work	9	12	6	2	6
5) In a relationship	1	11	4	1	6
6) Alone	5	11	5	1	7

Note. Phi = Phi coefficient; DI = Differential importance; Neg = Proportion of negative attributes; DI_R = Differential importance_revised; Neg_R = Proportion of negative attributes_revised; Phi = .32; DI = .48; Neg = .77; DI_R = -.55; Neg_R = .67; Depression (Radloff, 1977) = 31; Social anxiety (Mattick & Clarke, 1998) = 74.

Phi, Φ

Phi is an indicator of how evenly positive and negative attributes are distributed within each self-aspect. This indicator is the positive square root of the chi-squared statistic (χ^2) divided by the total number of words (N)[$\phi = \sqrt{(\chi^2/N)}$]. It ranges from 0 to 1. The closer the value is to 0, the more integrated it is, and the closer it is to 1, the more compartmentalized it is.

Differential Importance, DI

DI is the correlation coefficient using the "Importance" and "value obtained by subtracting negativity from positivity (that is, Valence)"of each aspect as different variables. The range of DI is -1 to +1. The closer the value is to 1, the more important the positive aspect is perceived compared to the negative aspect. In contrast, if it is close to -1, the negative aspect is recognized as relatively more important than the positive aspect.

Differential Importance_Revised, DI_R

Sometimes the DI can be miscalculated. The participant in Table 1 who had high scores for depression and social anxiety were misclassified as positive compartmentalization or integration because of the positive correlation between importance and valence (DI = .48). To complement this misclassification, the DI_R was calculated by modifying the existing DI calculation method. It was modified to weigh the perceived importance of valence. The range of DI_R was also -1 to +1. The method of interpretation was the same as that of the DI. The formula for this calculation is as follows: For reference, 42 is the value multiplied by "the maximum value of importance (7)" and "the maximum value obtained by subtracting negativity from positivity (6)". As shown in Table 1, DI_R was -.55. Finally, the participants were classified into negative compartmentalization or integration.

$$\text{DI\_R} = \sum\left[\frac{\text{Importance} \times (\text{Positivity} - \text{Negativity})}{42}\right] \div \text{N (the number of self aspects)}$$

Proportion of negative attributes, Neg

Neg is a calculation of the total ratio of negative words among all words used in the card-sorting task. The range of Neg is from 0 to 1, and the closer it is to 1, the higher the proportion of negative attributes. In Table 1, the total number of negative words is 71, and the total number of used words is 92. Therefore, Neg is .77.

Proportion of negative attributes_Revised, Neg_R

Neg_R considers the importance of Neg. The calculation process is as follows. First, multiply the "negative word ratio" and the"Importance" in each aspect, and aggregate all. The negative word ratio refers to the ratio of negative words used among all negative words in each aspect. In this study, there were 13 negative words in each aspect. The aggregated value was then divided by the maximum value of importance: 7. Finally, the divided value was divided by the number of self-aspects. The range of Neg_R was 0 to 1. The method of interpretation was the same as that used by Neg. Neg_R is .67 in this modified calculation.

$$\text{Neg\_R} = \sum\left[\frac{(\text{the number of negative words} \div 13) \times \text{Importance}}{7}\right] \div \text{N (the number of self aspects)}$$

Center for Epidemiologic Studies Depression Scale, CES-D

The CES-D is a self-report questionnaire developed by the American Institute of Mental Health to measure depression in the general population (Radloff, 1977). In this study, the scale validated by Chon et al. (2001) was used. With 20 items, the frequency of the past week was selected on a four-point scale. The total score ranges from 0 to 60, with a higher score indicating more depression. Cronbach's α was both .91 in the study by Chon et al. (2001) and in this study.

Procedure

The collected data were analyzed using IBM SPSS Statistics 26.0. First, correlation analyses were performed for the Phi coefficient, DI, DI_R, Neg, Neg_R, and depression variable. After mean centering, a hierarchical regression analysis was conducted to examine the main and interaction effects of the predictive variables on depression. When the interaction effect was significant, as inprevious studies (Kim, 2020; You & Lee, 2013), a t-test was conducted after dividing each predictive variable by the mean values to identify the pattern of the effect.

Results

Correlation analyses between main variables

The correlation results and descriptive statistics for the main vari-

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Table 2. *Correlation between Scales (N = 292)*

	1. Phi	2. DI	3. Neg	4. DI_R	5. Neg_R	6. CES-D
1						
2	-.06					
3	.22**	-.15*				
4	-.28**	.32**	-.64**			
5	-.01	-.18**	.84**	-.43**		
6	.40**	-.16**	.58**	-.57**	.46**	
Mean	0.31	0.34	0.34	0.25	0.27	19.29
SD	0.12	0.45	0.14	0.23	0.13	10.41

Note. Phi = Phi coefficient; DI = Differential importance; Neg = Proportion of negative attributes; DI_R = Differential importance_revised; Neg_R = Proportion of negative attributes_revised; CES-D = Center for epidemiologic studies depression scale.
*$p < .05$, **$p < .01$.

ables are presented in Table 2. The Phi coefficient was negatively correlated with DI_R ($r = -.28$, $p < .01$), and positively correlated with Neg ($r = .22$, $p < .01$) and CES-D ($r = .40$, $p < .01$) . The correlations between all variables were significant, except for the Phi coefficient.

The effect of self–compartmentalization on depression: Moderating effect of the proportion of negative attributes

Before examining the main hypothesis, the relationship between self-compartmentalization and depression was repeatedly examined using DI and Neg which are variables used in previous studies. In other words, hierarchical multiple regression analysis was conducted to examine the moderating effect of Neg on the Phi coefficient and DI affect depression. The results of the analyses (Table 3) showed that the main effects of the predictor variables on depression symptoms were partially significant. Neg explained 32.5% of depression symptoms, $F(1, 281) = 135.09$, $p < .001$; Phi coefficient additionally explained 7.4% of the depression symptoms, $F(1, 280) = 34.27$, $p < .001$. However, the main effect of DI and the interaction effects of the predictor variables did not significantly explain the CES-D score.

The effect of self–compartmentalization on depression: The moderating effect of the revised proportion of negative attributes

Hierarchical multiple regression analysis was conducted to examine the moderating effect of Neg_R in the process of Phi coefficient and DI_R affect depression. As shown in Table 4, the main effects of the predictor variables on depressive symptoms were all significant. DI_R explained 32.6% of depression, $F(1, 290) = 140.13$, $p < .001$; the Phi coefficient additionally explained 6.1%, $F(1, 289) = 28.87$, $p < .001$, and Neg_R further explained 7.4% of depression, $F(1, 288) = 39.60$, $p < .001$. The two-way interaction effects of Phi coefficient and DI_R, Phi coefficient and Neg_R, and DI_R and Neg_R did not significantly explain depression. However, the three-way interaction effect of Phi coefficient, DI_R, and Neg_R further explained 0.8% of depression, $F(1, 284) = 4.04$, $p < .05$.

To analyze the effect of the three-way interaction on depression, participants were divided into two groups based on the mean value of the Phi coefficient. Participants with a high Phi coefficient were classified into a compartmentalization group, and those with a low Phi coefficient were classified into an integration group. In addition, the positive and negative-centered groups were divided based on the mean value of DI_R. High and low Neg_R groups were also classified based on the mean value of Neg_R. The results are shown in Figure 1.

Table 3. *Regression Results of Depression (Mo: Neg)*

Step	Variables	β	t	R^2	ΔR^2	ΔF
1	Neg(A)	.57	11.62***	.325	.325	135.09***
	Phi(B)	.28	5.85***	.398	.074	34.27***
	DI(C)	-.06	-1.35	.402	.004	1.83
2	B × C	-.03	-0.60	.403	.001	0.36
	A × B	.00	-0.04	.403	.000	0.00
	A × C	.00	-0.03	.403	.000	0.00
3	A × B × C	.03	0.56	.404	.001	0.32

Note. Phi = Phi coefficient; DI = Differential importance; Neg = Proportion of negative attributes.
***$p < .001$.

Table 4. *Regression Results of Depression (Mo: Neg_R)*

Step	Variables	β	t	R^2	ΔR^2	ΔF
1	DI_R(A)	-.57	-11.84***	.326	.326	140.13***
	Phi(B)	.26	5.37***	.387	.061	28.87***
	Neg_R(C)	.31	6.29***	.461	.074	39.60***
2	A × B	-.04	-0.79	.462	.001	0.62
	A × C	-.02	-0.47	.463	.000	0.22
	B × C	-.01	-0.16	.463	.000	0.03
3	A × B × C	.10	2.01*	.470	.008	4.04*

Note. Phi = Phi coefficient; DI_R = Differential importance_revised; Neg_R = Proportion of negative attributes_revised.
*$p < .05$, ***$p < .001$.

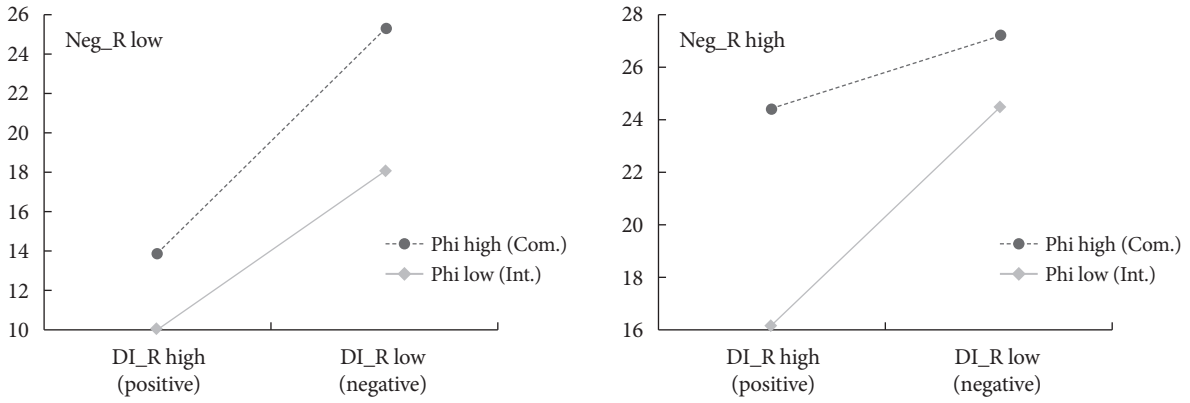

Figure 1. *3-way interaction tendency of Phi, DI_R, Neg_R on Depression.*
Note. Phi = Phi coefficient; DI_R = Differential importance_revised; Neg_R = Proportion of negative attributes_revised; Com. = Compartmentalization; Int. = Integration.

As shown in Figure 1, when Neg_R was low, the positive-centered integration group ($N = 61$, $M = 10.00$, $SD = 5.54$) had significantly lower depression scores than the positive-centered compartmentalization group ($N = 36$, $M = 13.86$, $SD = 6.78$), $t(95) = 3.05$, $p < .01$. In the same Neg_R condition, the negative-centered integration group ($N = 22$, $M = 18.00$, $SD = 9.95$) had significantly lower depression scores than the negative-centered compartmentalization group ($N = 35$, $M = 25.17$, $SD = 11.14$), $t(55) = 2.46$, $p < .05$.

Under the condition of high Neg_R, the positive-centered integration group ($N = 32$, $M = 16.19$, $SD = 8.13$) had a significantly lower depression score than the positive-centered compartmentalization group ($N = 15$, $M = 24.40$, $SD = 8.94$). However, there was no significant difference between the negative-centered integration group ($N = 39$, $M = 24.44$, $SD = 7.43$) and negative-centered compartmentalization group ($N = 52$, $M = 27.13$, $SD = 8.90$), $t(89) = 1.53$, *ns*.

Discussion

This study examined whether the proportion of negative attributes had a moderating effect on the process of compartmentalization and differential importance on depression. Before testing the hypotheses, we modified some calculation methods for variables related to compartmentalization. The main purpose of this study was to determine whether people with positive compartmentalization could become more depressed under the influence of negative content. The main results are as follows:

First, compartmentalization positively predicts depression. Compartmentalization positively correlated with depression and the proportion of negative attributes. The larger the Phi coefficient, the greater the prediction of depression. In addition, compartmentalization was negatively correlated with differential importance. This result implies that the higher the level of compartmentalization, the less important the positive self-aspect, and the higher the rate of use of negative adjectives and tendency to be depressed. In previous studies, compartmentalization predicted an increase in depression (You & Lee, 2013, 2020) and positively correlated with the proportion of negative attributes (Limke & Showers, 2010; Showers et al., 1998; Showers & Kling, 1996). The results of this study are in line with those of previous studies showing that compartmentalization could be a risk factor for depression.

Second, the differential importance_revised and proportion of negative attributes are useful for classifying compartmentalization. The proportion of negative attributes explained depression in all variables before and after modification. The proportion of negative attributes was calculated as the total ratio of negative words used in the overall aspect, and the proportion of negative attributes_revised was calculated considering the negative word ratio and weight of each aspect. Therefore, although these two indicators (Neg and Neg_R) measure different aspects of self-concept, both variables seem to significantly explain depression. However, differential importance explained depression only when the calculation method was modified. Considering that problems in the calculation method have been pointed out (Kim, 2020), differential importance_revised can more accurately inform the direction of

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compartmentalization, that is, whether it is organized around positives or negatives.

Third, the three-way interaction of compartmentalization, differential importance_revised, and the proportion of negative attributes_revised had a significant effect on depression. When the proportion of negative attributes was low, there was a main effect of compartmentalization and differential importance: the more compartmentalized, the higher the depression. In addition, the more important the negative aspect is, the higher the depression. However, when the proportion of negative attributes was high, there was an interaction effect between compartmentalization and differential importance. The positive compartmentalization group had higher depressive levels than the positive integration group. However, the negative compartmentalization group showed no significant differences in depression from the negative integration group. Only the positive integration group showed relatively lower depression than the other groups.

These results imply that if the positive aspect is regarded as important when negative self-concept content is low, integration as well as compartmentalization can be beneficial in reducing depression. However, when there were many negative contents, only positive integration was associated with depression reduction, and positive compartmentalization, negative compartmentalization, and negative integration predicted an increase in depression. Even though compartmentalization exacerbates depressive symptoms, in the case of positive compartmentalization, depression can be alleviated or exacerbated, depending on the negative content. This is consistent with the results of previous studies that suggest the hidden vulnerability of positive compartmentalization (Showers et al., 2015; Thomas et al., 2013; Zeigler-Hill & Showers, 2007). In addition, unlike positive integration, negative integration contributed to the worsening of depression to some extent, regardless of the amount of negative content. Therefore, integration is not unconditionally helpful in reducing depression, and it is necessary to closely examine the effects of positive-centered integration or negative-centered integration on depression.

The clinical implications of this study are as follows. To date, compartmentalization studies have dealt with depression by focusing on either the structural or content elements of self-concept. This study simultaneously examines the effects of both elements on depression. Specifically, positive compartmentalization is expected to have a short-term effect on alleviating depression if life goes smoothly and no problems occur in daily life. That is, if negative experiences are not important, people can get along well by seeing only positive points through positive compartmentalization. However, because compartmentalization itself tends to be vulnerable to negative life events, both positive and negative compartmentalization can exacerbate depression in situations in which negative content increases. On the other hand, positive integration enables realistic evaluation and coping with psychological problems by recognizing positive and negative factors, as they do not exclude negative aspects (You & Lee, 2013).

One interesting result is negative integration. Negative integration may reflect attempts to minimize negative effects and may be an intermediate process for positive integration, but it was found to be ineffective in reducing depression. When intervening, integration is usually attempted after the middle of treatment; however, if stagnation occurs during the negative integration stage for a long time, it seems necessary to suspend the integration strategy for a while and re-explore the cause of the problem.

The limitations of this study are as follows: First, in relation to the measurement of compartmentalization, the validity problem of the S-SAT can be raised. Unlike other versions of the test (Hwang, 2007; Showers, 1992), the S-SAT presented six self-aspects in advance to reduce task difficulty and increase measurement consistency. However, compartmentalized and integrated groups may have different ways of constructing self-aspect categories (Limke et al., 2017), and subsequent research should consider ways to freely describe self-aspects while maintaining the advantages of S-SAT.

Second, in this study, the calculation methods for differential importance and the proportion of negative attributes were modified and used for analysis to understand the compartmentalized structure in detail. Whether the revised indicators are more appropriate should be examined in future research.

Third, this study was based on the participants' self-reports. Unlike self-concept content, since the self-concept structure contains a preconscious aspect that is difficult to recognize by oneself, it may be difficult to measure the self-concept structure using a self-report method (Guerrettaz & Arkin, 2016). If various measurement methods such as interviews or experimental techniques

are used, the cognitive structure can be evaluated more accurately.

Author contributions statement

Deuk-Kweon You, Ph.D., a graduate student at The Catholic University of Korea, designed the study, collected, and analyzed data, and prepared the manuscript. Young-Ho Lee, a professor at The Catholic University of Korea, supervised and guided the research process. All the authors provided critical feedback, participated in the revision of the manuscript, and approved the final submission.

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