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## **Original Articles**

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# Bidirectional Processes between Interparental Conflict and Children's Negative Emotionality in Early Childhood: Predicting School-Age Problem Behavior

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This study investigates the longitudinal bidirectional process between interparental conflict and children's negative emotionality, and examines whether they predict children's later problem behaviors. The participants were 2,150 children (1,091 boys; 1,059 girls) and their parents who participated in a large longitudinal panel study on Korean families, the Panel Survey on Korean Children of the Korea Institute of Child Care and Education. In this study, data from children aged 0–9 years were included in the analysis, and the bidirectional process between interparental conflict and children's negative emotionality was explored from 0 to 4 years of age. Statistical analysis was conducted using a non-recursive model within a structural equation modeling framework. Both interparental conflict and children's negative emotionality positively predicted problem behaviors at nine years of age. However, the bidirectional relationship between interparental conflict and children's negative emotionality appeared in the opposite direction to the hypothesis at age one and was not significant thereafter. In the Discussion section, suggestions for future studies along with the clinical significance of parental conflict as a target to consider in children's interventions are addressed.

**Keywords:** interparental conflict, negative emotionality, child adjustment, problem behavior, early childhood, panel survey on Korean children

## Introduction

It is well-established that interparental conflict increases the risk of maladjustment among children, including externalizing and internalizing problems (Peterson & Zill, 1986; Stallman & Ohan, 2016; Vaez et al., 2015). The risk of children's psychopathology associated with repeated exposure to interparental hostility is nearly

twice as high as that associated with parental divorce (Grych & Fincham, 2001). Moreover, early individual variability in children's negative emotionality is a salient predictor of later psychological problems (Kostyrka-Allchorne, Wass, & Sonuga-Barke, 2020; Pauli-Pott & Beckmann, 2007). However, the effects of interparental conflict and children's negative emotionality have mostly been examined in separate studies, and relatively little is known about how they may simultaneously determine children's adjustment over time. Thus, this study aimed to examine longitudinal reciprocal process between these two factors as a predictor of problem behaviors in middle childhood.

Interparental conflict is a multidimensional construct composed of various components of conflicts that occur in marital relationships, such as the frequency of conflicts, hostile, disengaged, and constructive behaviors, and child-related conflicts (van Eldik et

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al., 2020). As the concept of interparental conflict encompasses substantial hostility and aggression, it should be distinguished from marital quality (van Eldik et al., 2020). However, even though the term “interparental” assumes the couple has offspring(s), the concept has often been used interchangeably with “marital conflict” and “marital discord” in studies examining children’s psychological functions (Davies & Cumming, 1994; Warmuth et al., 2018; Kopystynska et al., 2022; Rhoades, 2008). Therefore, in this study, interparental conflict was defined as a construct that taps the overall conflict within parents’ marital relationship and is not limited to parenting-related conflicts.

Exposure to interparental conflict predicts child outcomes across multiple domains, including aggressive behavior (Doh et al., 2012), relationship problems (Kim et al., 2009), and internalizing and externalizing behaviors from early childhood to adolescence (Cui et al., 2007; Warmuth et al., 2018). Three theoretical explanations have been shown to explain the relationship between interparental conflict and children’s adjustment problems. According to the spillover hypothesis, parents’ negative interaction patterns can compromise optimal parenting behavior or parent-child relationships (Gao et al., 2019; Halford et al., 2018). Specifically, marital conflict may drain emotional resources and increase distress, which may make parents more irritable, and less patient and less warm toward their children (Grych, 2002). Studies on infancy and childhood have shown that couples in chronic conflict are less sensitive and responsive, or more negatively reactive toward their children (Gao et al., 2019; Owen & Cox, 1997; Stroud et al., 2011). According to the social learning theory, children may imitate negative and hostile behaviors by observing their parents in conflict (Bandura, 1973). For example, although the social learning theory may not be the only explanation, individuals who have been more exposed to interparental conflicts show higher risks of conflictual relationships with their romantic partners (Cui et al., 2010; Kim et al., 2009). Finally, emotional security theory proposes that repeated exposure to parents’ negative behaviors may lead to children’s emotional insecurity, which refers to the perceived threats to their social circumstances, and physical reactions against the perception of insecurity, which may contribute to their vulnerability to psychological problems (Davies & Martin, 2014). Emotional security is critical in children’s acquisition of regulatory abilities and

development of positive relationships (Davies & Cumming, 1994). Based on emotional security theory, studies have shown that compromised emotional security resulting from interparental conflict during toddlerhood and early childhood predicts children’s later internalizing and externalizing problems (Brock & Kochanska, 2016; Cumming et al., 2012).

Negative emotionality, the core component of the difficult temperament construct (Bates, 1980; Rothbart, 2011), can be defined as a disposition to easily experience negative emotions, such as fear, anger, sadness, and compromised soothability in response to negative experiences (Rothbart & Bates, 1998). Many studies have supported negative emotionality as a major risk factor for concurrent and long-term outcomes, including internalizing and externalizing problems (Eisenberg et al., 2009; Sanson et al., 2004; Zeman et al., 2002). Children with higher negative emotionality are likely to react more negatively to various environmental stimuli (Goldsmith et al., 1987). Therefore, they may be more easily aroused and distressed during interparental conflicts. Indeed, empirical studies have found that these children are more vulnerable to environments with high interparental conflict (Hentges et al., 2015; Pauli-Pott & Beckmann, 2007).

Although conceptualized as a temperamental factor on a biological basis, negative emotionality appears to be at least partly determined by environmental quality during development (Gordon-Hacker & Gueron-Sela, 2020; Lipscomb et al., 2011). Destructive behaviors and heightened negativity of parents during marital conflict may be a major environmental stressor for children and contribute to increased problem behavior through compromised emotional security and/or imitation (Cumming et al., 2002; Halford et al., 2018). For example, higher levels of interparental conflict during infancy predict children’s negative emotionality and emotional regulation in toddlerhood (Frankel et al., 2015). In this study, children’s negative emotionality was also related to maternal negative reactions to children’s emotions, which may increase the risk of problematic behaviors (Frankel et al., 2015). Moreover, according to a previous study that traced diary marital conflicts, exposure to parents’ negative emotions and destructive conflict tactics was associated with negative emotionality in children aged 4-11 years (Cumming et al., 2002).

Empirical evidence is scarce; however, there have been theoretic-

cal suggestions that children's difficult temperament may also impact parents' marital relationships (e.g., Chang & Fine, 2007; Fan et al., 2020). Parents with temperamentally demanding children feel less pleasure and more burden, which may be associated with the quality of their relationship (Chang & Fine, 2007; Leve et al., 2001). For example, infants' difficult temperaments positively predict maternal conflict (Mehall et al., 2009; Papoušek & von Hofacker, 1998). In studies on preschoolers, children's negative emotionality undermined parents' co-parenting behavior, which is closely associated with marital quality (Cook et al., 2009; Fan et al., 2020). Taken together, previous studies have shown that the association between interparental conflict and children's negative emotionality may be bidirectional.

However, few studies have investigated the reciprocal processes between interparental conflict and children's negative emotionality, specifically from a longitudinal perspective (Davies et al., 2012; Frankel et al., 2015). An exception is a longitudinal study on preschoolers and their parents wherein parents' marital discord predict children's negative emotional reactions, which subsequently predict marital discord, a process mediated by children's behavioral dysregulation (Schermerhorn et al., 2007). As mentioned, prior studies have indicated that children's negative emotionality negatively influences parental relationships, and that interparental conflict is also associated with an increasing trace of children's negative emotionality in development. Therefore, based on the existing literature, it is possible that interparental conflict and children's negative emotionality reciprocally deteriorate over time. Thus, this study was designed to investigate bidirectional associations between interparental conflict and negative emotionality in early childhood (i.e., 0 to 4 years) and to examine whether they predict children's later problem behavior in middle childhood (i.e., nine years).

## Methods

### Participants and procedures

Participants were 2,150 children (1,091 boys; 1,059 girls) and their families participated in the Panel Survey on Korean Children (PSKC) conducted by the Korea Institute of Child Care and Education (KICCE). The PSKC has followed a nationally-representative co-

hort of children since 2008 and included annual data collection from children, parents, and/or teachers. In this study, PSKC data from T1 (child age: 0 years) to T10 (child age: nine years) were analyzed. Regarding parent education, 33% of mothers and 37% of fathers were four-year college graduates, followed by high school (mothers: 29%; fathers: 25%), and two-year college graduates (mothers 27%; fathers 20%). The average monthly family income was KRW3,429,000. This study was approved by the Institutional Review Board (IRB) of Sungkyunkwan University (IRB File No. SKKU 2022-09-001).

### Measures

#### Interparental conflict

Interparental conflict was measured using the Interparental Conflict Scale (Chung, 2004; Markman et al., 2001), which was adapted so that respondents were asked to rate each item on a 5-point scale (1 = not at all; 5 = very much) instead of a dichotomous scale (i.e., yes/no). The scale comprises eight items that measure parents' perceptions of interparental conflict individually (e.g., "When we fight, I usually evade the situation to cut off the discord", "Small arguments frequently turn into big fights, and we swear and condemn each other revealing partner's prior faults"), with higher scores indicating higher levels of interparental conflict. However, in this study, items 6 ("I seriously think about what it would be like to date or marry someone else") and 7 ("I feel lonely in my married life") were eliminated from the analysis based on our decision that they did not directly address conflictual interaction between parents. Interparental conflict variables from T1 (0 years) to T5 (four years) were included in the analysis. The Cronbach's  $\alpha$  ranged from .92 to .94.

#### Children's negative emotionality

Information on negative emotionality was collected using the 20-item emotionality scale of Emotionality, Activity, and Sociability (EAS) Temperament Survey for Children-Parental Ratings (Buss & Plomin, 2014; Mathiesen & Tambs, 1999). This scale was measured using the mothers' reports on their children's negative emotionality levels from T1 (0 year) to T5 (four years). The scale comprises three subscales: negative emotionality (e.g., "My child cries easily", "My child is somewhat emotional"), activity (e.g., "My

child is very active”, “My child is constantly on the move”), and shyness/sociability (e.g., “My child is very social”, “My child likes to be with people”). Each item is rated on a scale of 1 to 5, with higher scores indicating higher levels of each subscale. In this study, only the questions of the negative emotionality subscale, total of five questions, were utilized. Cronbach’s  $\alpha$  for the negative emotionality ranged from .73–.76.

#### Children’s problem behaviors

Children’s problem behaviors at T10 (nine years) were measured using the Child Behavior Checklist (CBCL) 6–18 (Achenbach, 1991; Oh & Kim, 2010). Parents were asked to rate each item on a 3-point Likert scale (0 = not at all; 2 = absolutely) based on their perception of their children’s problem behavior. In this study, the raw scores of the broadband externalizing and internalizing scales were used. Cronbach’s  $\alpha$ s for externalizing and internalizing scales were .66 and .59, respectively.

#### Instrumental variables

Parents’ income at T1 was measured using an interval variable, which ranged across one million won (approximately 800 US dollars) intervals. Parents were asked to check the applicable box for their average monthly income level ( $M=3,429$  won,  $SD=1.47$ ). Children’s sleep problem behavior at T1 was measured using the CBCL 1.5-5 (Child Behavior Checklist; Achenbach, 1991; Oh & Kim, 2010). Parents were asked to rate each item on a 3-point Likert scale (0 = not at all; 2 = absolutely) based on their perception of their children’s sleep behavior. Raw scores on the sleep problem scale were used for this study. Cronbach’s  $\alpha$  was .53.

#### Statistical analysis

Following descriptive statistics, bivariate variables, and  $t$ -tests to explore sex differences, our goal was to analyze the mutual influence of matched-pairs dyadic (each person paired with another) variables over time within a structural equation modeling (SEM) framework using a non-recursive model (Griffin & Gonzalez, 1995; Kenny, 1996; Woody & Sadler, 2005). The non-recursive model includes reciprocal causal effects, and all disturbances are correlated. Specifically, through the mutual effect model, autoregressive and reciprocal effects, which represent the bidirectional

effect between two variables at the same measurement occasion, can be estimated (Kline, 2005). In this study, the simultaneous and mutual influence between interparental conflict and children’s negative emotionality at each time point over five years (i.e., T1–T5) was examined using the mutual influence model (Kenny, 1996; Woody & Sadler, 2005).

Regarding the constructs included in the analysis, interparental conflict and children’s problem behaviors were included in the model as latent variables. Specifically, interparental conflict was created based on the manifest variables in each parent’s individual reports. A latent factor of children’s problem behavior was constructed using externalizing and internalizing problems as manifest variables. Children’s negative emotionality was included as a single manifest variable. Non-recursive models are prone to identification and technical estimation difficulties; therefore, the requirement for the models is strong (Kline, 2005). Instrumental variables were incorporated into the non-recursive model to aid in model identification for the mutual influence model. Instrumental variables allow us to estimate mutual influence at T1 (Kline, 1998). In other words, without instrumental variables, the model could be misidentified, and researchers could not estimate the mutual influence effect at the first time point (Heise, 1975). Unless there is strong conceptual justification, simply erasing a mutual influence effect path does not make an endogenous variable an instrument; eventually, it can lead to a misidentified model (Woody & Sadler, 2005). Thus, family income and children’s sleep problems were used as instrumental variables for interparental conflict and children’s negative emotionality, respectively.

The mutual influence model was analyzed using a maximum likelihood estimator with robust standard errors (MLR), using *lavaan* package in R 4.1.1 version (R Core Team, 2022). Full information maximum likelihood (FIML) was applied to handle missing data, meaning that all available data were used to estimate the model (Enders & Bandalos, 2001). Model fit was evaluated based on the criteria of comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and  $\chi^2$  likelihood ratio statistic. Sex differences were explored using conducting  $t$ -tests among all the variables.

Table 1. Descriptive Statistics and Bivariate Correlations.

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Child's sex	-	-																			
2. Income	3.43	1.47	.050*																		
3. NE, age 0	2.72	.61	-.018	-.072**																	
4. NE, age 1	2.71	.63	.018	-.064**	.458***																
5. NE, age 2	2.84	.61	.018	-.075**	.295***	.486**															
6. NE, age 3	2.87	.62	.022	-.048	.243***	.412***	.529***														
7. NE, age 4	2.80	.64	.009	-.055*	.233***	.363***	.495***	.573***													
8. IC-M, age 0	2.00	.80	-.018	-.092***	.153***	.163***	.151***	.135***	.149***												
9. IC-M, age 1	2.05	.80	-.013	-.061**	.066**	.174***	.138***	.183***	.160***	.675***											
10. IC-M, age 2	2.11	.80	-.022	-.056*	.076**	.146***	.202***	.159***	.161***	.591***	.643**										
11. IC-M, age 3	2.13	.79	-.018	-.081**	.043	.168***	.148***	.217***	.158***	.566***	.616***	.657***									
12. IC-M, age 4	2.15	.81	-.005	-.032	.089***	.170***	.184***	.189***	.214***	.543***	.601***	.658***	.676***								
13. IC-F, age 0	1.99	.76	-.033	-.032	.057*	.106***	.111***	.086**	.095***	.565***	.493***	.444***	.416***	.420***							
14. IC-F, age 1	2.10	.77	.008	-.048	.081**	.141***	.131***	.165***	.116***	.449***	.611***	.468***	.448***	.444***	.536***						
15. IC-F, age 2	2.17	.80	.022	-.011	.021	.098***	.133***	.118***	.087***	.420***	.419***	.583***	.486***	.489***	.524***	.541***					
16. IC-F, age 3	2.22	.79	-.026	-.055*	.052*	.134***	.105***	.139***	.134***	.422***	.476***	.505***	.614***	.519***	.483***	.528***	.584***				
17. IC-F, age 4	2.18	.77	-.005	-.024	.068**	.117***	.110***	.111***	.138***	.428***	.446***	.496***	.511***	.625***	.497***	.499***	.580***	.610***			
18. INT, age 9	.11	.16	-.059*	-.065*	.077**	.146***	.182***	.217***	.264***	.076**	.098***	.103***	.144***	.113***	.085**	.059*	.078**	.115***	.117***		
19. EXT, age 9	.12	.18	-.122***	-.030	-.001	.101***	.144***	.183***	.202***	.102***	.136***	.093***	.130***	.133***	.090**	.067*	.051	.065*	.076**	.511***	

Note. M = mother's -report; F = father's report; NE = negative emotionality; IC = interparental conflict; INT = internalizing behavior; EXT = externalizing behavior.  
 \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

**Table 2.** Results of Independent *t*-test by Child's Sex

Variable	Mean (SD)		<i>t</i>	<i>df</i>
	Boys	Girls		
Negative Emotionality, age 0	2.73 (.60)	2.70 (.63)	.84	2,042
Negative Emotionality, age 1	2.70 (.61)	2.72 (.64)	-.77	1,890
Negative Emotionality, age 2	2.83 (.62)	2.86 (.61)	-.75	1,764
Negative Emotionality, age 3	2.86 (.61)	2.89 (.62)	-.91	1,696
Negative Emotionality, age 4	2.79 (.63)	2.80 (.66)	-.36	1,668
Interparental Conflict-M, age 0	2.02 (.80)	1.99 (.80)	.79	1,856
Interparental Conflict-M, age 1	2.06 (.82)	2.04 (.78)	.54	1,829
Interparental Conflict-M, age 2	2.12 (.81)	2.09 (.78)	.91	1,720
Interparental Conflict-M, age 3	2.14 (.80)	2.11 (.79)	.76	1,695
Interparental Conflict-M, age 4	2.15 (.80)	2.15 (.82)	.19	1,662
Interparental Conflict-F, age 0	2.01 (.74)	1.96 (.78)	1.33	1,648
Interparental Conflict-F, age 1	2.10 (.77)	2.11 (.77)	-.33	1,747
Interparental Conflict-F, age 2	2.15 (.78)	2.19 (.81)	-.90	1,638
Interparental Conflict-F, age 3	2.24 (.80)	2.20 (.78)	1.03	1,619
Interparental Conflict-F, age 4	2.18 (.77)	2.18 (.77)	.19	1,605
Internalizing Behavior, age 9	.12 (.16)	.10 (.16)	2.22*	1,430.55
Externalizing Behavior, age 9	.14 (.19)	.10 (.16)	4.68***	1,420.97
Total Problem Behaviors, age 9	.13 (.14)	.10 (.14)	3.65***	1,430.54

Note. M = mother's report; F = father's report.

\* $p < .05$ , \*\*\* $p < .001$ .

## Results

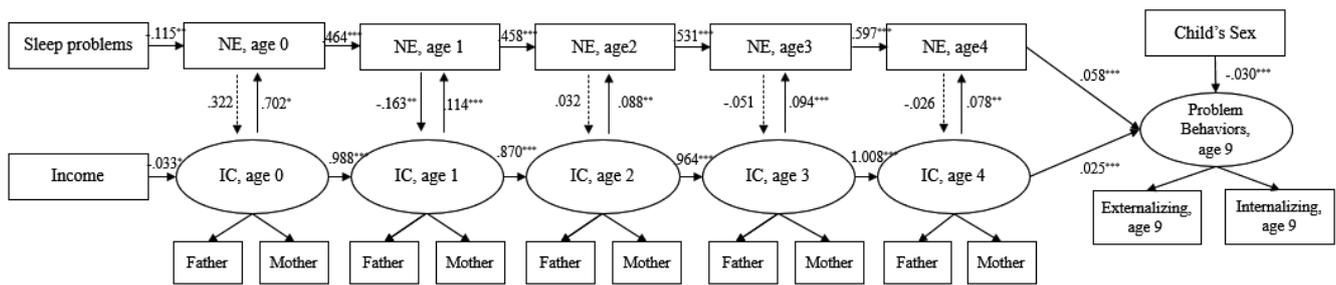
### Preliminary analysis

Table 1 presents the descriptive statistics and bivariate correlations for all the study variables. Interparental conflict and children's negative emotionality were mostly positively and significantly associated ( $r = .02-.22$ ). This means that the strength of the relationship between interparental conflict and children's negative emotionality is modest (Cohen, 1988). Moreover, interparental conflict and children's negative emotionality are significantly correlated with children's later externalizing and internalizing behaviors ( $r = .05-.22$ ), which means that the strength of the relationship is moderate. Specifically, the intensity of the relationship between children's negative emotionality and externalizing and internalizing behavior is modest ( $r = .10-.26$ ) and statistically significant, except for negative emotionality at age three and externalizing behavior at age nine. In addition, the relationship between interparental conflict and externalizing and internalizing behaviors is modest ( $r = .06-.14$ ), and statistically significant, except for interparental conflict at age two and externalizing behavior at age nine

(Cohen, 1988). As shown in Table 2, the results of *t*-tests to examine sex differences indicated that boys demonstrated significantly higher levels of externalizing and internalizing problems at T10 (age nine).

### Mutual influence model

Using a non-recursive path model, we examined the mutual processes between interparental conflict and children's negative emotionality from T1 to T5 and their association with children's problem behavior at T10. The results are shown in Figure 1. Model fit indices were as follows:  $\chi^2(147) = 1234.83$ ,  $p < .001$ ; CFI = .907; TLI = .882; RMSEA = .064(.060, .067). As chi-square was statistically significant, it could be interpreted as a model and the data did not fit well. Thus, we evaluated approximate model fit indices such as CFI, TLI, and RMSEA. According to the model fit, it had an acceptable fit because CFI, TLI > 0.8 (Bagozzi & Yi, 1988), and RMSEA  $\leq 0.08$  (Steiger, 1990; Browne & Cudeck, 1992). All autoregressive paths of children's negative emotionality and interparental conflict were significant and positive from T1 to T5, which support the temporal stability in those constructs over time. Regarding mutu-



**Figure 1.** Results of the proposed path model.

Note. NE = Negative emotionality; IC = Interparental conflicts.

al influence effects, interparental conflict significantly predicted children's negative emotionality at each time point from T1 to T5 ( $b = .702, p < .05$ ;  $b = .114, p < .001$ ;  $b = .088, p < .01$ ; and  $b = .094, p < .001$ ;  $b = .078, p < .01$ , respectively); whereas it was vice versa at T2 ( $b = -.163, p < .01$ ) in the unexpected direction such that higher levels of children's negative emotionality predicted lower levels of interparental conflict. Thus, a bidirectional process between interparental conflict and children's negative emotionality was only observed at T2 (children aged one year). Finally, interparental conflict and children's negative emotionality at T5 were significantly predictive of children's problem behavior at T10 ( $b = .025, p < .001$ ; and  $b = .058, p < .001$ , respectively).

## Discussion

This study aimed to examine longitudinal bidirectional processes between interparental conflict and children's negative emotionality in early childhood as predictors of later problem behaviors in middle childhood within a nationally-representative sample of Korean children and families in the community. Our findings suggest that the reciprocal relationship between interparental conflict and children's negative emotionality is mostly not identified and only the direction of influence from interparental conflict on children's negative emotionality is predominant. However, at age one, a reciprocal relationship between the two factors emerged, but the effect of children's negative emotionality was in the opposite direction that was initially hypothesized. Moreover, these two were significant predictors of later problem behaviors in children.

First, both predicted increased problem behaviors at the age of nine. The finding that interparental conflict predicts later problem

behaviors aligns with that of previous studies, and many related factors, such as parenting (Kaczynski et al., 2006), attachment security (Brock & Kochanska, 2016), and children's engagement (Davies & Martine, 2014), have been presented to explain the mechanisms. Moreover, negative emotionality is a critical predictor for later internalizing and externalizing behaviors (Eisenberg et al., 2009; Sanson et al., 2004; Zenman et al., 2002). However, we explored the longitudinal reciprocal relationship between interparental conflict and negative emotionality postulating that both amplify each other for the first time.

These findings indicate that interparental conflict may negatively affect children's negative emotionality during early childhood. This is consistent with emotional security theory (Davies & Cummings, 1994), which proposes that repeated exposure to interparental conflicts may compromise children's sense of emotional security by amplifying their distress and reactivity to subsequent interpersonal conflict. Moreover, deficits in emotional security may contribute to the development of various problem behaviors. However, previous studies that explored the relationship between negative emotionality and interparental conflict are rare, and existing studies have examined the association between these two factors and have postulated and identified children's temperamental factors, such as irritability and negative emotionality, as moderators of the relationship between interparental conflict and children's malfunctions (e.g., Pauli-Pott & Beckmann, 2007; Hentges et al., 2015). The results of these studies suggest that children with high negative emotionality are more susceptible to subsequent problems when exposed to interparental conflict than those with an inherently low level of negative emotionality. Therefore, this study complements previous research by showing that negative

emotionality can be elevated by frequent exposure to interparental conflict. In other words, negative emotionality differentiates the consequences of exposure to chronic interparental conflict and deteriorates during the process. Congruently, the vicious cycle of interparental conflict increases negative emotionality, and an augmented level of negative emotionality makes children more susceptible to chronic interparental conflict. The accumulated negative emotionality contributes to children's current and later adjustment problems.

Moreover, children's negative emotionality at the age of one significantly predicted interparental conflict, although in an unexpected direction, such that higher children's negative emotionality led to lower levels of interparental conflict. An explanation for this counterintuitive finding can be speculated based on previous studies that demonstrated the association between children's difficult temperament, fearfulness, and negative emotionality and parents' positive behavior in infancy (Lengua & Kovacs, 2005; Rubin et al., 2002). Parents may initially try harder to deal with children's difficult behavior by increasing their support and positive behavior (Lengua & Kovacs, 2005). Similarly, those who raise children with high negative emotionality may reduce their levels of interparental conflict, and instead focus more on their children, at least in the early years. However, after the age of one, negative emotionality seemed to have no statistically significant effect on interparental conflict. Therefore, our results suggest that bidirectional processes between interparental conflict and children's negative emotionality may exist in infancy, and the pathway from interparental conflict to children's negative emotionality becomes more salient over time than vice versa. However, our findings should be replicated, as few studies have examined the effect of children's negative emotionality on parental discord. As negative emotionality represents 'internal reactivity to environmental stimuli', it does not directly reflect children's behavioral reactions to the environment (Sallquist et al., 2009). In a previous study, researchers found that children's negative reactivity and behavioral dysregulation accounted for parents' current and later marital discord from approximately six to nine years of age (Schermerhorn et al., 2007). Moreover, if we included variables more directly related to children's temperament, such as parenting behaviors (Lengua & Kovacs, 2005; Lipscomb et al., 2011) to explain the pathway, we might find more indication

for children's effect on the parental relationship. Moreover, as only the period from zero to four years old was examined in this study, different patterns may exist in later childhood and adolescence. Therefore, future studies on eclectic facets are required to explore this aspect.

This study has several limitations. First, although we used a large dataset, most participants were non-patients; thus, we need to be cautious in generalizing the current findings to children and adolescents who are experiencing clinical levels of problem behavior. Second, despite our efforts to use multiple informants, except for paternal reports of interparental conflict, all data were obtained using maternal reports, leading to a risk of inflated correlation among variables. In future studies, it would be beneficial to incorporate multiple methods and informants such as teachers' reports, laboratory tasks, and observations. Third, although we were primarily interested in the role of children's negative emotionality and its relationship to interparental conflict and later problem behavior, existing studies suggest the potential roles of other dimensions of temperament (e.g., effortful control; Thompson et al., 2020; Valiente et al., 2007). Finally, based on previous studies that have highlighted early childhood as a critical period of psychological development (Gilliom & Shaw, 2004; Lipscomb et al., 2011), we could only follow the longitudinal bidirectional effect between interparental conflict and children's negative emotionality in the first four years of life. Our study yielded meaningful findings; However, it is necessary to track these processes beyond early childhood to explore their changes over time.

Despite these limitations, as an initial effort to clarify the bidirectional processes between interparental conflict and child temperament, this study offers several methodological and practical implications. Specifically, using a non-recursive model, we illustrated that mutual effects may be examined by simultaneously estimating the influence of two matched-pair (dyadic) variables and correlated disturbances at each time point. Moreover, we use a large nationally representative sample of Korean children who were followed across multiple years of childhood which allowed us to investigate how interparental conflict and child temperament may exchange effects in developmental periods. Regarding practical implications, our findings highlight the need to focus on interparental conflict as a possible contributor to children's negative

emotionality along with parenting behavior, which has typically received more clinical attention in child treatment. There is evidence that interventions targeting interparental conflict and co-parenting relationships have positive effects on parents' marital relationship and mental health, as well as on children's regulatory abilities and psychological functioning (Cowan et al., 2011; Cumming et al., 2008; Feinberg & Kan, 2008). Our study suggests that early childhood may be a promising window for facilitating children's development by helping parents handle interparental conflict better.

### Author contributions statement

SP was responsible for literature review, research model construction, and writing. HO and YJ were responsible for data screening, analysis, and writing. SL was responsible for the writing. HC advised on all parts of the study and wrote the manuscript. All authors have contributed to the manuscript and approved the submitted version.

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# The Effect of Compartmentalization of Other-concept on Depression

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This study examined whether compartmentalizing other-concept can further explain depression while controlling for the compartmentalization variables of self-concept. To analyze the difference in the effect of other-concept compartmentalization, Study 1 measured the other-concept of an intimate person, and Study 2 measured the other-concept of general figures, such as typical college students. In each study, the structures of self-concept (S-SAT), other-concept (S-OAT), and depression were measured in 190 college students. While the main effect of the self-concept control variables was significant, the other-concept variables did not predict depression in Study 1; however, the proportion of negative attributes of others predicted a decrease in depression in Study 2. Moreover, in Study 2, there was an interactive effect of compartmentalization and the differential importance of other-concepts. The group that positively compartmentalized the concept of a typical college student had a S-OAT higher depression than the group that negatively compartmentalized it. However, the difference in depression was not significant between the group that negatively compartmentalized the concept and the group that negatively integrated it. Finally, the clinical implications and limitations of the study are discussed.

**Keywords:** compartmentalization, integration, self-concept, other-concept, depression

## Introduction

The interpersonal problems of individuals with depression are one of the main concerns of cognitive therapists. This is because negative thoughts and emotions of individuals with depression can stand out in an interpersonal context. However, studies investigating interpersonal aspects, such as other-concepts in individuals with depression, are insufficient compared to studies on self-concept studies, and the results are not clear (Yune & Oh, 2004). In

previous studies, the self-concepts of individuals with depression were consistently negative, but their other-concepts were sometimes positive or negative (Carnelley et al., 1994; Girz et al., 2017; Koenig et al., 1995).

Studies on other-concepts have focused on the relationship between content factors and depression. The content factor may be positive or negative depending on the object of the other-concept (e.g., *friends or strangers*) and certain aspects of others in specific situations (e.g., *when you are alone or in a relationship*). When the interpersonal patterns of individuals with depression differ because of differences in the other-concept, it is necessary to explore the variables that can stably explain this difference. Some researchers emphasize the structural aspects of other-concept, such as the compartmentalization method of self-concept, which has explained depression (Showers, 1992; You & Lee, 2013), and expect the compartmentalization of other-concepts to predict the interpersonal relationship of individuals with depression (Showers & Zeigler-Hill, 2004).

Compartmentalization theory focuses on the distribution of

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positive and negative contents across multiple self-aspects (Showers, 1992). Individuals with high level of compartmentalization process their self-aspects as either positive or negative (e.g., *Me as a friend: friendly, cautious, and optimistic; Me as a lover: indifferent, passive, and anxious*). Those with low level of compartmentalization integrate their thoughts or emotions by recognizing all the positive and negative contents of each self-aspect (e.g., *Me as a friend: responsible, curious, stubborn, and indecisive*). Hence, compartmentalization may be classified according to whether emphasis is placed on the positive or negative content of each self-aspect (You & Lee, 2022).

As shown in a previous study by Showers (1992), when the compartmentalization group considered positive aspects more important, they only recognized their positive points and had a lower level of depression and higher level of self-esteem than those in the integration group. However, when the compartmentalization group considered the negative aspects more important, depression levels were higher than those in the integration group, while focusing on the negative aspects (Showers, 1992). In addition, the middle-aged group with major depressive disorder had a higher rate of compartmentalization and proportion of negative attributes than the control group (Dalglish et al., 2011). The proportion of negative attributes (Neg) explains the negative content included in the self-concept, which increases with the level of negative stress (Showers et al., 1998). Zeigler-Hill and Showers (2007) revealed that the compartmentalization group reacted sensitively to negative life events such as social rejection, and their self-esteem was unstable. That is, behind the overly positive self-concept is a low sense of self-esteem, which can activate negative content, even with minor criticism and rejection (Showers et al., 2015; Thomas et al., 2013).

Compartmentalization may not stably predict the quality and satisfaction of relationship. Showers and Kevlyn (1999) showed that, at the time of the study, individuals who positively compartmentalize their lovers report having a better relationship relative to those who engage in positive integration. However, evidence suggests that, in the long term, positive compartmentalization of others is more likely to be associated with aggravation and cutting-off of relationships with others (Showers & Zeigler-Hill, 2004). Likewise, Limke and Showers (2010) revealed that compartmentalization of the parent concept could explain the unstable adult

child-parent relationship.

Therefore, unless negative aspects are activated, the perception of negative experiences can be avoided through compartmentalization. Positive compartmentalization can temporarily increase positive feelings for oneself and partners; however, these feelings are unrealistic and unstable, and can be vulnerable to change. On the other hand, integration can consider all positive and negative factors without excluding negative aspects. That is, even though integration requires more psychological effort than compartmentalization, it makes it possible to evaluate and cope with psychological problems more realistically.

To date, studies have only revealed that positive compartmentalization of other-concept could predict unstable interpersonal relationships (Limke & Showers, 2010; Showers & Zeigler-Hill, 2004). However, the relationship between compartmentalization of other-concepts and depression has not yet been examined. Considering that compartmentalization of others predicts interpersonal problems and that depression can worsen in relationship scenes, it is necessary to examine whether compartmentalization of others can stably predict depression.

Two factors should be considered when measuring other-compartmentalization. First, studies that examined the relationship between other-compartmentalization and interpersonal problem did not include self-concept variables in the analysis (Limke & Showers, 2010; Showers & Kevlyn, 1999; Showers & Zeigler-Hill, 2004). In the comparative analysis of self- and other-concepts (Aron et al., 1991; Brown et al., 2009), these concepts were correlated, and the concept of more intimate people (e.g., *lovers or families*) was measured; the higher the intimacy, the higher the correlation. Therefore, the instability of others' compartmentalization revealed in previous studies may be a result of self-compartmentalization. To accurately measure the effect of other-compartmentalization, it is necessary to include all the variables of self and others in the analysis and examine whether the other-concept variables can further explain depression.

Second, the concept of others was set differently in each study. Studies that have suggested that negative views of individuals with depression are limited to self-concept have set fictional standard characters (e.g., *typical college students*) as others (Girz et al., 2017; Koenig et al., 1995). Other studies have argued that both con-

cepts of self and others are negative have set intimate people (e.g., *lovers, spouses, and friends*) as others (Carnelley et al., 1994; Gara et al., 1993; Moritz & Roberts, 2018). In other words, it is possible that the other-concept of individuals with depression was either positive or negative according to the intimacy between the participants and targeted others. Hence, to measure the effect of other-concepts, it seems necessary not only to measure the self- and other-concepts at the same time but also to classify and analyze intimacy with targeted others.

This study was divided into two to examine the effect of compartmentalization of others on depression. First, the concept of an intimate person is measured and analyzed to determine whether it can further explain depression while controlling for self-concept variables. Next, the concept of ordinary individuals, such as typical college students, is measured to verify whether it can further predict depression while controlling for self-concept variables.

When measuring the concept of intimate others, the concepts of self and others are highly correlated; thus, other-concept variables may not predict an increase in depression. However, when measuring the concepts of ordinary others, it is possible to predict an increase in depression after controlling for self-concept variables because of the low correlation between self- and other-concepts. In addition, because an individual with depression has a negative self-concept but a positive concept of a general person (Girz et al., 2017; Koenig et al., 1995), positive compartmentalization of the other-concept while maintaining a negative self-concept may reflect the general interpersonal characteristics of an individual with depression. Therefore, this study aimed to explore whether positive compartmentalization of the concepts of intimate and ordinary figures could have a different effect on depression.

### Study 1

Study 1 attempted to examine whether the compartmentalization of intimate other-concepts could further explain depression after controlling for self-concept variables.

## Methods

### Participants

After obtaining approval from the Institutional Review Board of

The Catholic University of Korea, 200 undergraduate and graduate students participated in an online survey. Among them, one participant who submitted the same data in duplicate and nine who responded insincerely were excluded. A total of 190 data points were included in the final analysis: 13.7% were men ( $n = 26$ ) and 86.3% were women ( $n = 164$ ). The age of the participants was between 18 and 55 years, and the mean age was 24.6 ( $SD = 5.51$ ).

### Measurements

#### Short version of self-aspect test (S-SAT)

The short version of the self-aspect test (S-SAT) is a paper-pencil version of a self-descriptive card-sorting task, and the problem of SAT (Hwang, 2007) has been revised and supplemented (You & Lee, 2022). The participants described their six self-aspects with the response set, which included 13 positive and 13 negative expressions. This test was conducted to calculate phi, differential importance, and the proportion of negative attributes (Showers, 1992). In this study, phi, differential importance\_revised, and proportion of negative attributes\_revised were calculated based on a previous study (You & Lee, 2022).

#### Phi ( $\Phi$ )

The phi coefficient is the positive square root of the chi-square statistic ( $\chi^2$ ) divided by the total number of words [ $\Phi = \sqrt{(\chi^2/N)}$ ]. This indicator 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 (Showers, 1992).

#### Differential Importance\_Revised ( $DI_R$ )

Differential importance (DI) is a measure of the relative importance of positive and negative self-aspects.  $DI_R$  is a variable that modifies the calculation method of DI (You & Lee, 2022). The positivity, negativity, and importance of each aspect were evaluated on a 7-point scale and were calculated as follows: The range of  $DI_R$  is -1 to +1, which is the same as that of the existing indicator. The closer the value is to 1, the more important the positive aspect is perceived compared to the negative aspect and vice versa.

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

*The proportion of negative attributes\_Revised (Neg\_R)*

Neg is a calculation of the total ratio of negative words to all words used in the card-sorting task. Neg\_R is an indicator that considers the importance of the original indicator (You & Lee, 2022). The formula for this calculation is as follows: The proportion of negative words refers to the ratio of negative words used to all 13 negative words in each aspect. The range of Neg\_R is 0 to 1, and the closer it is to 1, the more negative the content is in the self-concept.

$$Neg\_R = \frac{\sum [ \frac{(\text{the number of negative words} + 13) \times \text{Importance}}{7 (\text{maximum value of importance})} ]}{N (\text{the number of self aspects})}$$

Short version of other-aspect test (S-OAT), intimate other version  
 The short version of the other-aspect test (S-OAT) is the “other” version of the S-SAT. In Study 1, the “other” was the most intimate. Except for the subject of measurement, the construction of the test was the same as that of the S-SAT. In addition, the sex of the intimate other and their relationship periods were investigated. In this study, 82.1% of the participants (*n* = 156) chose same-sex other, and 17.9% (*n* = 34) chose the opposite-sex other, and the average relationship period was 75 months.

Center for epidemiologic studies depression scale (CES-D)

The CES-D is a self-report questionnaire on depression in the general population, which is developed by the American Institute of Mental Health (Radloff, 1977). This study used the scale validated by Chon et al. (2001). The frequency of the past week was selected

on a 4-point scale with 20 items. The total score ranges from 0 to 60, with higher scores indicating greater depression. Cronbach’s  $\alpha$  was both .91 in the study by Chon et al. (2001) and Study 1.

**Procedure**

The online versions of the CES-D, S-SAT, and S-OAT were administered to undergraduate and graduate students aged 18 years or older. Prior to the survey, participants were informed of the purpose of the study and how to complete the survey. Rewards were given to those who completed the online survey. The collected data were analyzed using IBM SPSS Statistics 26.0. First, correlation analyses were performed between the self- and other-concept variables. A hierarchical multiple regression analysis was then conducted to examine whether other-concepts can further explain depression while controlling for self-concept variables. In addition, to analyze the results, the relationship between self-concept and depression was further analyzed while controlling for other-concept variables. The predictive variables were mean-centered before the analysis.

**Results**

**Correlation analyses between the main variables**

Table 1 presents the correlation results for the main variables. Self\_Com and Other\_Com (*r* = .50, *p* < .01), Self\_DIR and Other\_DIR (*r* = .65, *p* < .01), and Self\_NegR and Other\_NegR (*r* = .59,

**Table 1.** Correlation between Scales (*N* = 190)

	1. S_Phi	2. S_DIR	3. S_NegR	4. O_Phi	5. O_DIR	6. O_NegR	7. CES-D
1							
2	-.02						
3	-.23**	-.57**					
4	.50**	.05	-.19*				
5	.08	.65**	-.30**	.03			
6	-.38**	-.45**	.59**	-.37**	-.54**		
7	.14*	-.55**	.49**	.01	-.36**	.36**	
Mean	0.29	0.22	0.31	0.29	0.26	0.24	19.23
SD	0.14	0.23	0.14	0.14	0.24	0.15	9.22

*Note.* The shading compartments show the correlation between the self- and other-concept variables. S\_Phi = Self Phi coefficient; S\_DIR = Self Differential importance\_revised; S\_NegR = Self Proportion of negative attributes\_revised; O\_Phi = Other Phi coefficient; O\_DIR = Other Differential importance\_revised; O\_NegR = Other Proportion of negative attributes\_revised; CES-D = Center for epidemiologic studies depression scale.  
 \**p* < .05, \*\**p* < .01.

$p < .01$ ) were positively correlated. In short, variables related to self-concept had a positive correlation with variables related to other-concepts.

However, Self\_Com was negatively correlated with Self\_NegR ( $r = -.23, p < .01$ ) and positively correlated with depression ( $r = .14, p < .05$ ). Self\_DIR was negatively correlated with Self\_NegR ( $r = -.57, p < .01$ ) and depression ( $r = -.55, p < .01$ ), and Self\_NegR was positively correlated with depression ( $r = .49, p < .01$ ). In addition, Other\_Com and Other\_NegR ( $r = -.37, p < .01$ ) were negatively correlated. Other\_DIR was negatively correlated with Other\_NegR ( $r = -.54, p < .01$ ) and depression ( $r = -.36, p < .01$ ), while Other\_NegR was positively correlated with depression ( $r = .36, p < .01$ ).

**Effect of compartmentalization of other-concept on depression**

Hierarchical multiple regression analysis was conducted to examine whether other-concepts can further explain depression while controlling for self-concept variables. As presented in Table 2, the main effects of the control variables on depression were significant. Self\_DIR explained 29.7% of depression ( $F[1, 188] = 79.48, p < .001$ ); Self\_NegR further explained 4.8% of depression ( $F[1, 187] = 13.82, p < .001$ ); and Self\_Com further accounted for 4.3% of depression, ( $F[1, 186] = 13.10, p < .001$ ). However, the main and interaction effects of the predictive variables did not significantly explain the depressive symptoms.

The relationship between self-concept and depression was then

analyzed while controlling for other-concept variables. As shown (Table 2), the main effects of the predictors of depression were significant except for the effects of the control variables. Self\_DIR was added to 14.7% of depression ( $F[1, 185] = 40.27, p < .001$ ); Self\_Com explained 3.6% of depression ( $F[1, 184] = 10.25, p < .01$ ); and Self\_NegR explained 4.0% of depression ( $F[1, 183] = 12.36, p < .01$ ). However, the interaction effects of the predictive variables did not significantly explain the depressive symptoms.

Specifically, the more participants compartmentalized their self-concept, the less important they regarded the positive aspects of their self-concept; and the more negative the content they had on their self-concept, the higher their CES-D score. Even when controlling for other-concept variables, the main effects of the self-concept variables (*i.e.*, Self\_Com, Self\_DIR, and Self\_NegR) further explained the depressive symptoms. However, when controlling for the self-concept variables, the main and interaction effects of the other-concept variables (*i.e.*, Other\_Com, Other\_DIR, and Other\_NegR) did not further explain depressive symptoms. Therefore, in an intimate relationship, it appears that the structure and content of a self-concept can affect depression more than other-concepts.

**Study 2**

In Study 2, instead of an intimate person, the concept of a general person, such as a typical college student, was measured. Data were analyzed in the same manner as those in Study 1.

**Table 2.** Regression Analysis of Self-concept and Other-concept Variables on Depression

Step	Variables	$\beta$	$R^2$	$\Delta R^2$	$\Delta F$	Variables	$\beta$	$R^2$	$\Delta R^2$	$\Delta F$
1	S_DIR	-.55***	.297	.297	79.48***	O_DIR	-.36***	.129	.129	27.78***
	S_NegR	.27***	.346	.048	13.82***	O_NegR	.23**	.166	.037	8.39**
	S_Phi	.22***	.389	.043	13.10***	O_Phi	.12	.178	.011	2.56
2	O_NegR(A)	.15	.400	.012	3.63	S_DIR(A)	-.51***	.325	.147	40.27***
	O_DIR(B)	-.03	.401	.000	0.09	S_Phi(B)	.23**	.360	.036	10.25**
	O_Phi(C)	.00	.401	.000	0.00	S_NegR(C)	.29**	.401	.040	12.36**
3	B × C	.05	.403	.002	0.59	B × C	.11	.411	.010	3.21
	A × C	-.05	.404	.001	0.44	A × B	-.01	.411	.000	0.05
	A × B	-.02	.404	.000	0.08	A × C	.00	.411	.000	0.00
4	A × B × C	.05	.405	.001	0.17	A × B × C	.12	.421	.010	3.04

Note. S\_Phi = Self Phi coefficient; S\_DIR = Self Differential importance\_revised; S\_NegR = Self Proportion of negative attributes\_revised; O\_Phi = Other Phi coefficient; O\_DIR = Other Differential importance\_revised; O\_NegR = Other Proportion of negative attributes\_revised; CES-D = Center for epidemiologic studies depression scale.

\*\* $p < .01$ , \*\*\* $p < .001$ .

## Methods

### Participants

In Study 2, 200 undergraduate and graduate students participated in the online survey. Among them, six who submitted the same data in duplicate and four who responded insincerely were excluded. A total of 190 data points were included in the final analysis: 23.2% were men ( $n = 44$ ) and 76.8% were women ( $n = 146$ ). The age distribution ranged from 18 to 48 years with a mean age of 25.0 ( $SD = 5.74$ ).

### Measurements

#### S–SAT

The S–SAT was the same as that used in Study 1. Phi, DI\_R, and Neg\_R of self-concept were used for analysis.

#### S–OAT (Typical college version)

The S–OAT was the same as that used in Study 1, except for the subject of the other, which changed to typical college students. Phi, DI\_R, and Neg\_R of the other-concept were used for analysis.

#### CES–D scale

The CES–D was the same as that used in Study 1, and the Cronbach’s  $\alpha$  in Study 2 was .89.

### Procedure

The procedure and data analysis were the same as those in Study 1,

except for the subject of the other-concept. In the case of significant interaction verified from the hierarchical multiple regression analysis, a  $t$ -test was conducted to specifically investigate the pattern. Prior to conducting the  $t$ -test, predictors were divided based on the upper and lower values of 30%.

## Results

### Correlation analyses between the main variables

The correlation results for the main variables, including Self\_Com and Other\_Com, are presented in Table 3. First, between the variables of self-concept and other-concept, the correlation results were as follows: Self\_Com and Other\_Com ( $r = .45, p < .01$ ), Self\_DIR and Other\_DIR ( $r = .44, p < .01$ ), and Self\_NegR and Other\_NegR ( $r = .55, p < .01$ ) were positively correlated. That is, in the case of typical college students, variables related to self-concept had a positive correlation with variables related to other-concepts, similar to the case of intimate others.

However, Self\_Com was negatively correlated with Self\_NegR ( $r = -.20, p < .01$ ) and tended to be positively correlated with depression ( $r = .14, p < .10$ ). Self\_DIR was negatively correlated with Self\_NegR ( $r = -.40, p < .01$ ) and depression ( $r = -.53, p < .01$ ), and Self\_NegR was positively correlated with depression ( $r = .45, p < .01$ ). Moreover, Others\_Com and Other\_NegR ( $r = -.28, p < .01$ ) were negatively correlated. Other\_DIR was negatively correlated with Other\_NegR ( $r = -.22, p < .01$ ). Other\_Com, Other\_DIR, and

**Table 3.** Correlation between Scales ( $N = 190$ )

	1. S_Phi	2. S_DIR	3. S_NegR	4. O_Phi	5. O_DIR	6. O_NegR	7. CES-D
1							
2	-.08						
3	-.20**	-.40**					
4	.45**	-.00	-.12				
5	.16*	.44**	-.06	.00			
6	-.34**	.03	.55**	-.28**	-.22**		
7	.14†	-.53**	.45**	.06	-.09	.06	
Mean	0.35	0.18	0.29	0.32	0.24	0.27	20.27
SD	0.14	0.21	0.14	0.15	0.20	0.15	8.77

Note. The shading compartments show the correlation between the self- and other-concept variables.

S\_Phi = Self Phi coefficient; S\_DIR = Self Differential importance\_revised; S\_NegR = Self Proportion of negative attributes\_revised; O\_Phi = Other Phi coefficient; O\_DIR = Other Differential importance\_revised; O\_NegR = Other Proportion of negative attributes\_revised; CES-D = Center for epidemiologic studies depression scale.

† $p < .10$ , \* $p < .05$ , \*\* $p < .01$ .

Other\_NegR did not significantly correlate with depression.

#### Effect of compartmentalization of other-concepts on depression

Prior to the analysis, as that in Study 1, the relationship between self-concept and depression was analyzed while controlling for other-concept variables. As shown (Table 4), the main effects of the predictors of depression were significant, except for the effects of the control variables. Self\_NegR was added to 25.1% of depression ( $F[1, 185] = 63.26, p < .001$ ); Self\_Com further explained 2.9% of depression ( $F[1, 184] = 7.68, p < .01$ ); and Self\_DIR further explained 1.7% of depression ( $F[1, 183] = 4.51, p < .05$ ). However, the interaction effect of the predictive variables did not significantly explain the depressive symptoms.

A hierarchical multiple regression analysis was then conducted to examine whether the other-concept can further explain depression while controlling for self-concept variables. As shown (Table 4), the main effects of the control variables on depression were significant, as those in Study 1. Self\_NegR explained 20.6% of depression ( $F[1, 188] = 48.69, p < .001$ ); Self\_Com further explained 5.3% of depression ( $F[1, 187] = 13.43, p < .001$ ); and Self\_DIR further accounted for 3.0% of depression ( $F[1, 186] = 7.86, p < .001$ ).

Even when controlling for variables of self-concept on depression, Other\_NegR explained 2.2% of depression ( $F[1, 185] = 5.83, p < .05$ ); the main effects of Other\_Com and Other\_DIR did not significantly explain the CES-D score. In addition, the two-way

interaction effect of Other\_Com and Other\_DIR further explained 1.6% of depression ( $F[1, 182] = 4.42, p < .05$ ); however, the interaction effects of other predictors did not significantly explain depressive symptoms.

To further investigate the two-way interaction of Other\_Com and Other\_DIR on depression, four groups were classified based on the 30% of the upper and lower values of two predictive variables: Other-Compartmentalization (Other\_Com) and Other-Integration (Other\_Int) groups, and positive and negative-centered groups. As shown (Figure 1), the positive-centered Other\_Com group ( $N = 17, M = 24.65, SD = 11.84$ ) showed higher levels of depression than the positive-centered Other\_Int group ( $N = 19, M = 15.47, SD = 8.87, t[34] = 2.65, p < .05$ ). However, there was no significant difference in the CES-D score between the negative-centered Other\_Com group ( $N = 18, M = 19.5, SD = 9.74$ ) and negative-centered Other\_Int group ( $N = 23, M = 21.65, SD = 6.21, t[39] = 0.40, ns$ ).

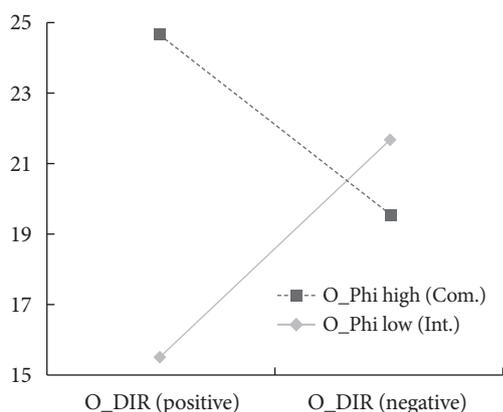
In summary, the main effect of the self-concept variables strongly predicted depression. There was also a main effect of Other\_NegR and a two-way interaction effect of Other\_Com and Other\_DIR while controlling for self-concept variables. When the self-concept was negative, depressive symptoms decreased as other-concepts were negative and increased as other-concepts were compartmentalized positively. That is, in general relationships, both self and other-concepts had an effect on depression.

**Table 4.** Regression Analysis of Self-concept and Other-concept Variables on Depression

Step	Variables	$\beta$	$R^2$	$\Delta R^2$	$\Delta F$	Variables	$\beta$	$R^2$	$\Delta R^2$	$\Delta F$
1	S_NegR	.45***	.206	.206	48.69***	O_DIR	-.09	.008	.008	1.54
	S_Phi	.24***	.259	.053	13.43***	O_NegR	.05	.011	.003	0.49
	S_DIR	-.19**	.289	.030	7.86**	O_Phi	.07	.015	.004	0.84
2	O_NegR(A)	-.19*	.311	.022	5.83*	S_NegR(A)	.60***	.266	.251	63.26***
	O_DIR(B)	-.04	.312	.002	0.42	S_Phi(B)	.20**	.296	.029	7.68**
	O_Phi(C)	-.02	.312	.000	0.05	S_DIR(C)	-.15*	.312	.017	4.51*
3	B × C	.14*	.329	.016	4.42*	A × B	.09	.318	.006	1.55
	A × C	.09	.334	.006	1.55	B × C	.09	.326	.008	2.09
	A × B	.05	.336	.002	0.47	A × C	.00	.326	.000	0.00
4	A × B × C	.06	.338	.002	0.62	A × B × C	-.06	.328	.002	0.00

Note. S\_Phi = Self Phi coefficient; S\_DIR = Self Differential importance\_revised; S\_NegR = Self Proportion of negative attributes\_revised; O\_Phi = Other Phi coefficient; O\_DIR = Other Differential importance\_revised; O\_NegR = Other Proportion of negative attributes\_revised; CES-D = Center for epidemiologic studies depression scale.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .



**Figure 1.** 2-way interaction effect of *O\_Phi*, *O\_DIR* on Depression. Note. *O\_Phi* = Other Phi coefficient; *O\_DIR* = Other Differential importance\_revised; Com. = Compartmentalization; Int. = Integration.

## Discussion

This study attempted to examine whether the structural and content components of other-concepts can further explain depression while controlling for self-concept variables. The main results are as follows:

First, compartmentalization, differential importance, and the proportion of the negative attributes of self-concept were positively correlated with those of other-concepts, and this correlation was significant regardless of whether the concept was about participants' close friends or general people. However, compared to the concept of general figures, intimate others showed a significant correlation with depression and had a higher correlation coefficient with self-concept. Therefore, the relationship between self and other-concepts depends on the intimacy of the other, and the more intimate the other-concept, the more likely it is to be similar to the self-concept (Aron et al., 1991; Brown et al., 2009).

In addition, the compartmentalization of self-concept was negatively correlated with the proportion of negative attributes and positively correlated with depression; that is, the higher the level of compartmentalization, the more positive the content and possibility of depression. This result is consistent with previous studies that, whether positive or negative compartmentalization, compartmentalization itself may be a risk factor for depression (You & Lee, 2013; Zeigler-Hill & Showers, 2007).

Second, in intimate relationships, self-concept better explained the increase in depression than other-concept. The main effects of

self-concept compartmentalization, differential importance, and proportion of negative attributes were significant for both the control and predictive variables. The more the self-concept was compartmentalized, the more depressed it was, and the less important the positive aspects of the self-concept were regarded, the more depressed it was, and the more negative the content of the self-concept, the more depressed it was. However, in intimate relationships, other-concept compartmentalization, differential importance, and the proportion of negative attributes did not explain depression, and the interaction effects of these predictors did not.

The above results seem to support the argument that the additional explanatory power of intimate other-concept may be insufficient under the control of self-concept because of the high explanatory power of the self-concept and high correlation between the concepts of self and others. In addition, because individuals with depression have both negative concepts of self and intimate figures, positive compartmentalization of intimate other-concepts is unlikely to account for increased depression (Carnelley et al., 1994; Moritz & Roberts, 2018; Siegel & Alloy, 1990). In intimate relationships, the structure and content of self-concept seem to have more influence on depression than on other-concepts.

Third, in general, both self and other-concepts predicted depression. The main effects of self-concepts were significant for both the control and predictor variables. However, the main effects were not significant when the other-concept was first analyzed as a control variable. These results suggest that, even in general relationships, negative self-concept has a stronger effect on depression than negative other-concepts (Choi & Lee, 1998).

In addition, the proportion of the negative attributes of other-concepts further explained depression only after controlling for the variables of self-concepts; depression levels decreased when there was more negative content in the other-concept. This result appears to be partially explained by social comparison theory (Swallow & Kuiper, 1988). A study on social comparison explains that individuals with depression infer their experiences negatively through upward comparisons, comparing their experiences to those who seem to have done better than themselves. Those without depression maintain their self-esteem through downward comparison, focusing on the strengths that they do better than others. Therefore, the inferential can be made from the results of

this study: When self-concept is negative, the negative evaluation of others in general interpersonal relationships may have caused a decrease in depression by providing an opportunity to compare with others in a manner favorable to them (Swallow & Kuiper, 1990, 1992).

Finally, in Study 2, there was an interactive effect of compartmentalization and the differential importance of the other-concept. Specifically, the group that positively compartmentalized the concept of a typical college student had higher depressive levels than the group that positively integrated it. However, the difference in depression was not significant between the group that negatively compartmentalized the concept and the group that negatively integrated it. Previous studies have shown that individuals with depression have negative self-concept but positive other-concept in general relationships (Girz et al., 2017; Koenig et al., 1995). Considering that the self-concept variables used as control variables in this study predicted an increase in depression, it appears that individuals with negative self-concept attempting to see only the good things of the other person may cause an upward comparison between themselves and others, which may increase depression (Swallow & Kuiper, 1988).

Therefore, the results of this study reaffirm the importance of self-concept in depression and support the assertion that there are hidden vulnerabilities in the positive compartmentalization of other-concept and self-concept (Showers & Zeigler-Hill, 2004; You & Lee, 2022). However, the integration of the other-concept was relatively low in depressive level only when it was positive, and the depressive level was as high as compartmentalization when it was negative. That is, integration is not always beneficial for depression reduction. These results may be related to the fact that it is difficult to integrate other-concepts when the self-concept is negative; hence, it is necessary to recognize the problem of the self before dealing with the problems of others in the context of relationship conflict.

The clinical implications of this study are as follows: To date, unlike self-concept, studies on depression have not consistently explained the role of other concepts. This study revealed that the self- and other-concepts of individuals with depression are associated with each other and that their other-concept can be changed to the degree of intimacy of the target. Specifically, in an intimate

relationship, only self-concept compartmentalization predicted depression, whereas in general relationships, compartmentalization of self- and other-concepts significantly explained depression. These results suggest that individuals with depression may have different ways of organizing their thoughts and emotions depending on object relationships and that other-concept compartmentalization may explain some of the unstable interpersonal problems of individuals with depression. Hence, it may be prudent for therapists to be aware of these factors.

The limitations of this study are as follows: The correlation coefficients between compartmentalization and depression in Studies 1 and 2 differed slightly. The first reason for this difference may be that the recruited participants in Studies 1 and 2 were not homogenous. As the participants were recruited from various online communities, the age and sex distributions differed in Studies 1 and 2. In future studies, it is recommended to consider the demographic characteristics of the recruited participants.

Second, in this study, a self-report test was developed to understand the compartmentalized structure in detail, and the calculation methods for differential importance and proportion of negative attributes were modified and used for analysis. Among them, the revised proportion of negative attributes of others did not predict depression in Study 1 and did predict a decrease in depression in Study 2. This difference seems to be due to the different concepts of others in Studies 1 and 2; however, it should be continuously examined in subsequent studies for the validation of S-SAT and modified indicators.

In addition, the phi coefficient was based on the chi-square test. Although there are many negative words and few positive words in all aspects, when the ratio of positive and negative words remains almost the same for each aspect, the phi coefficient is bound to be low (Park, 1996). Thus, it is possible to lower the correlation coefficient with other variables, such as depression. Although there are not many cases of such extremes, it seems that to measure compartmentalization more accurately, calculation methods should be improved.

#### Author contributions statement

Deuk-Kweon You, Ph.D, a graduate student at The Catholic Uni-

versity of Korea who designed the study, collected and analyzed data, and prepared the manuscript. Young-Ho Lee, 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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# Differential Effects of Reflection and Brooding on the Relationship Between Anxiety Sensitivity and Self-harm: A Serial Mediation Study

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Anxiety sensitivity is known to increase the risk of self-harm; however, the underlying mechanisms remain unclear. Studies have considered rumination as a potential factor that increases the risk of suicide, and anxiety sensitivity has been proposed as a probable factor that affects self-harm through rumination. We investigated the mediating effect of rumination on anxiety sensitivity and self-harm and extended the study by examining the involvement of two subtypes of rumination, reflection and brooding. Responses on anxiety sensitivity, rumination, and history of self-harm were collected from psychiatric patients ( $N = 148$ ) at a university hospital. Mediation analyses were conducted to examine the simple mediating effect of global rumination and serial mediating effect of reflection and brooding between anxiety sensitivity and self-harm. Rumination mediated the relationship between anxiety sensitivity and self-harm, while reflection and brooding sequentially mediated the path from anxiety sensitivity to self-harm. Additionally, brooding alone mediated this path, whereas reflection alone did not. Our findings indicate that rumination increases the risk of self-harm in psychiatric patients with high anxiety sensitivity. Furthermore, they indicate that reflection may turn into brooding and heighten the risk of self-harm, suggesting that interventions for individuals with high anxiety sensitivity to prevent self-harm should target both reflection and brooding.

**Keywords:** rumination, reflection, brooding, anxiety sensitivity, self-harm

## Introduction

As the prevalence of self-harm has increased over the past few decades (Cheon et al., 2020; Griffin et al., 2018), it has gained attention in the mental health field. However, the definition of self-harm, unaffected by its growth in frequency and intensity, has remained

ambiguous over the years (Mangnall & Yurkovich, 2008). In an effort to distinguish underlying intentions of self-harm, scholars have introduced the concept of nonsuicidal self-injury (NSSI) characterized as any damage done to one's body without intent to die (Nock, 2009). Despite these differences, NSSI and suicide attempts are not entirely dissimilar and share some commonalities. The gateway theory views them as fundamentally compatible behaviors with distinguished depictions that lie in a spectrum (Brausch & Gutierrez, 2010; Whitlock et al., 2013). Moreover, the intention underlying self-harming behavior is not always clear, not only for clinicians but also for individuals who engage in self-harming behaviors (Kapur et al., 2013). Therefore, despite attempts to distinguish between types of self-harming behavior, the terms self-harm and self-injury are often used comprehensively to encompass any

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behavior intended to damage one's body that may result in destruction, illness, or ultimate death (Brereton & McGlinchey, 2020; Linehan et al., 2006).

Self-harm is frequently reported in the clinical population, and patients who suffer from mental illnesses such as depression, anxiety, addiction, lack of impulse control, and personality disorders are, above all, at higher risk of it (Chai et al., 2020; Hawton et al., 2013). Depression is one of the leading risk factors of self-harm; anxiety, a distressing emotion that occurs in anticipation of future threats (American Psychiatric Association, 2013), also escalates the risk considerably (Chartrand et al., 2012; Foley et al., 2006). One stable factor related to both depression and anxiety, called anxiety sensitivity, may expound mechanisms of self-harm (Naragon-Gainey, 2010). Anxiety sensitivity is defined as the fear of experiencing anxiety, and individuals who are extremely sensitive to anxiety catastrophize upcoming consequences in three areas (i.e., cognitive, physical, and social concerns) due to the misinterpretation of fearful situations (Stanley et al., 2018). It is an internal factor that increases anxiety levels in individuals and is highly associated with anxiety disorders (Reiss et al., 1986). Some studies have found that anxiety sensitivity is an integral variable that increases the rate of self-harm. Capron et al. (2012) conducted research targeting smokers and found that cognitive concerns were critical for predicting high suicidality. Another study that investigated the relationship between anxiety sensitivity and NSSI found that for people with substance use disorders, social concerns had a positive association with NSSI frequency and versatility (Dixon et al., 2018). In a meta-analysis study that explored anxiety sensitivity and its relationship with suicide, all three subfactors of anxiety sensitivity were proven to exert a greater risk of suicide, with cognitive concerns having the strongest effect (Stanley et al., 2018). However, the study results lack consistency, as other studies have revealed no significant differences in the level of anxiety sensitivity in self-injury history (McCoy et al., 2010), suggesting the need to investigate the mechanisms underlying the association between anxiety sensitivity and self-harm.

In exploring the factors causing and maintaining self-harm, emotion regulation has been repeatedly discussed (Favazza, 1998; Gratz, 2003). One representative emotion regulation strategy associated with self-harm is rumination, defined as a repetitive think-

ing style in which a person focuses on causes, consequences, and symptoms of negative affect (Nolen-Hoeksema, 1991). Along with avoidance and suppression, it is a maladaptive strategy empirically established as cognitive susceptibility for psychiatric patients, especially those with mood disorders (Cooney et al., 2010; Nolen-Hoeksema, 1991). The emotion cascade model provides a possible explanation for the relationship between rumination and self-harm (Selby et al., 2008). Rumination worsens and perpetuates negative emotions, which in turn escalates negative thoughts. Intensified unpleasant mood and cognition can then trigger compensatory responses to reduce distress. (Nolen-Hoeksema, 1991; Watkins & Roberts, 2020). At this stage, deficits in effective problem-solving skills may lead individuals to adopt maladaptive coping strategies such as self-harming behaviors to escape from an aversive state. Consequently, endogenous opioids are secreted to reduce pain, including emotional distress, thereby negatively reinforcing self-harming behaviors (Chapman et al., 2006; Selby et al., 2013). Gratz et al. (2016) also found that people who deliberately harm themselves implicitly associate self-harm with emotional relief, adding support to the extant literature on the emotional motives of self-harm (e.g., Buckholdt et al., 2015; Clapham & Brausch, 2022; Nock & Prinstein, 2004). Studies have shown that rumination is also interconnected with other mental illnesses including anxiety-related disorders, such as posttraumatic stress disorder, social anxiety, and obsessive-compulsive disorder (Dell'Osso et al., 2019; Mellings & Alden, 2000; Raines et al., 2017), but research on how rumination is associated with anxiety sensitivity and self-harm is still limited.

As rumination has been widely studied as a maladaptive cognitive style, several researchers have attempted to differentiate subtypes of rumination (Trapnell & Campbell, 1999; Treynor et al., 2003). Research has shown that rumination is broadly classified into two subtypes: reflection and brooding (Martin & Tesser, 1996; Treynor et al., 2003). Brooding is a coping behavior that involves making passive comparisons to ideals and a tendency to dwell on negative outcomes, while reflection is frequently defined as a cognitive process that focuses on problem solving in an attempt to understand the reasons behind the problems (Treynor et al., 2003). Despite the strong positive association between the two subtypes, brooding and reflection have been found to be predictive of distinct outcomes. Brooding is a widely used emotion regulation

strategy for individuals with depression, and it has been consistently associated with adverse outcomes, resulting in various negative psychological factors including substance abuse, suicidal ideation, and depression (Adrian et al., 2014; Cole et al., 2015; Crane et al., 2007). On the other hand, reflection is often recognized as a positive or adaptive emotion regulation strategy (Moberly & Watkins, 2008; Treynor et al., 2003). Because it is practiced when seeking solutions to problems, it is compatible with an adaptive cognitive coping style such as cognitive reappraisal, which involves reframing thoughts and attempting to change emotions to more positive ones (Gross & John, 2003; Lazarus, 1993; Troy & Mauss, 2011). Nonetheless, studies on reflection have shown mixed results and have even reported associations with unhealthy outcomes (Lengelle et al., 2016; Walbridge, 2021). For example, in studies exploring the relationship between reflection and suicidality, reflection was shown to have positive (Miranda & Nolen-Hoeksema, 2007), neutral (O'Connor & Noyce, 2008), and negative associations (Crane et al., 2007). The possibility of a moderating effect of participants' characteristics could be considered to investigate the factors that provoke the differential effects of reflection. Advocating this assumption, Treynor et al. (2003) revealed that brooding was the only subtype relevant to depression in targeted random community samples. In contrast, another study by Whitmer and Gotlib (2011) found that in currently depressed individuals, both reflection and brooding failed to successfully regulate negative emotions. It is possible that the level of psychological vulnerability or aspects of the symptoms may induce differences.

Despite consistent reports on their unique attributes, only a limited number of researchers have started to investigate the reciprocity of reflection and brooding, and have observed that reflection has the inclination to precede brooding (Kim & Kang, 2022; Takano & Tanno, 2009; Yang et al., 2021). In recent studies investigating the differential roles of brooding and reflection in a stressful environment, such as the COVID-19 pandemic, a serial relationship between reflection and brooding emphasized how initially positive intent of reflection does not always persist (Kim & Kang, 2022; Yang et al., 2021). In Kim and Kang's (2022) domestic study that investigated the path from perceived stress to life satisfaction and mediating effects of reflection and brooding, reflection showed a positive association not only with life satisfaction

but also with brooding. This study suggests that stressors like COVID-19 can trigger reflection in an attempt to cope, but because a portion of people engage in reflection and brooding simultaneously, the positive effects of reflection can easily diminish, initiating a vicious cycle of negative emotions and cognitions and hindering problem-seeking thoughts (Kim & Kang, 2022). Yang et al. (2021) focused on cognitive concerns of anxiety sensitivity in predicting anxiety severity through reflection and brooding and suggested that individuals who have high cognitive anxiety concerns as a trait tend to solve problems when faced with adversity, but when this cognitive coping style is not coupled with constructive action, it could only aggravate anxiety. Eventually, reflection can cause negative emotions in the short term, and negative emotions can also cause reflection (Treynor et al., 2003). In sum, even though reflection is generally adaptive and used to solve problems and achieve goals (Martin & Tesser, 1996), a failure to settle problems successfully causes reflection to persist and consequently deteriorate into brooding, which provokes immersion in negative thinking, such as passively comparing the current situation to the unachieved ideals and asking oneself "why" things have happened (Miranda & Nolen-Hoeksema, 2007). As previously mentioned, research has found that this transition could lead to negative outcomes, such as reduced life satisfaction (Kim & Kang, 2022), heightened risk of depression (Takano & Tanno, 2009) and elevated levels of anxiety (Yang et al., 2021). However, the above-mentioned studies have targeted healthy individuals, and studies exploring the sequential relationship between the two subtypes of rumination in clinical samples are lacking. Mental disorders (i.e., depression) can debilitate adaptive coping mechanisms, and rumination in people with psychiatric illnesses are expected to exacerbate negative outcomes, including self-harm (Siegle et al., 2004; Surrence et al., 2009). People with high anxiety sensitivity favor cognitive coping strategies in stressful situations to an excessive degree; however, due to low efficiency in emotion regulation, they tend to devote attention to negative stimuli and be preoccupied with pessimistic thought content, which in turn can increase the risk of self-harm by intensifying negative emotions (Klein et al., 2018). Therefore, although reflection is frequently discussed as an accommodative strategy, it may induce more maladaptive effects in psychiatric patients, especially those with high anxiety sensitivity.

In this study, we examined the possible tendency of psychiatric patients with high anxiety sensitivity to have a higher risk of self-harm, and the mediating role of rumination in the relationship between anxiety sensitivity and self-harm was also explored. In addition, we considered the respective roles and the sequential roles of reflection and brooding in predicting self-harm among psychiatric patients. Specifically, we hypothesized the following: rumination would mediate the relationship between anxiety sensitivity and self-harm; brooding and reflection would sequentially mediate the relationship between anxiety sensitivity and self-harm; and brooding and reflection would also sequentially mediate the relationship between each of the subfactors of anxiety sensitivity and self-harm. This study aimed to investigate the emotional (anxiety sensitivity) and cognitive (rumination: reflection and brooding) risk factors for self-harm in psychiatric patients and propose clinical implications and psychotherapeutic interventions based on these findings.

## Methods

### Participants

This study used data from psychological assessments administered to inpatients and outpatients at a university hospital in Seoul, South Korea. Out of 166 participants, we excluded data of those that reported active psychotic symptoms, had intellectual disabilities, and were diagnosed with neurocognitive disorders based on the criteria of DSM-5; 148 participants remained to be used in the final analyses. The participants included 97 men (65.5%) and 51 women (34.5%) between the ages of 18 and 79 years ( $M = 29.7$ ,  $SD = 13.5$ ). The level of education in the final sample comprised 2.7% middle school degree or less, 63.5% high school degree, 8.1% community college degree, 21.6% college degree, and 3.4% graduate or professional education, with one missing datum (0.7%). The primary diagnoses of the patients were major depressive disorder (61, 41.2%), persistent depressive disorder (23, 15.5%), attention-deficit/hyperactivity disorder (11, 7.4%), bipolar II disorder (11, 7.4%), posttraumatic stress disorder (8, 5.4%), and others. The disorders in the “other” category included alcohol use disorder (4, 2.7%), panic disorder (4, 2.7%), adjustment disorder (3, 2.0%), bipolar I disorder (3, 2.0%), unspecified anxiety disorder (3, 2.0%),

borderline personality disorder/trait (2, 1.4%), gambling disorder (2, 1.4%), unspecified depressive disorder (2, 1.4%), agoraphobia (1, 0.7%), autism spectrum disorder (1, 0.7%), borderline intellectual functioning (1, 0.7%), generalized anxiety disorder (1, 0.7%), insomnia (1, 0.7%), obsessive compulsive disorder (1, 0.7%), social anxiety disorder (1, 0.7%), social communication disorder (1, 0.7%), somatic symptom disorder (1, 0.7%), specific phobia (1, 0.7%), and Tourette’s disorder (1, 0.7%).

### Measures

#### Anxiety Sensitivity

To assess anxiety sensitivity, the Korean version of the Anxiety Sensitivity Index-3, validated by Lim and Kim (2012) and based on the original scale developed by Taylor et al. (2007), was used. The three subscales include social, cognitive, and physical concerns about anxiety, with higher scores indicating greater fear of anxiety symptoms. It has 18 items rated on a 5-point Likert scale, with scores ranging from 0 (very little) to 4 (very much). In the current study, the internal consistency for the social (Cronbach’s  $\alpha = 0.765$ ), cognitive (Cronbach’s  $\alpha = 0.748$ ), and physical (Cronbach’s  $\alpha = 0.807$ ) subscales were all found to be adequate.

#### Rumination

The Ruminative Response Scale developed by Nolen-Hoeksema and Morrow (1991) and validated in Korean by Kim et al. (2010) was used to measure rumination. Higher scores represent more frequent use of a repetitive thinking style, in which a person focuses on causes, consequences, and symptoms of negative affect. This scale has 22 items and is rated on a 4-point Likert scale, with scores ranging from 1 (almost never) to 4 (almost always). The total rumination score, along with the scores of two of the three subscales, reflection and brooding, were used in the analyses. A high score in reflection represents a cognitive process intentionally focusing on the internal self to solve problems and is neutral in emotional valence, whereas a high score in brooding represents comparing unachieved standards and the current situation and is negative in emotional valence. The internal consistency was 0.937 for total rumination, and 0.800 and 0.863 for reflection and brooding, respectively.

## Self-Harm

Trained clinical psychologists with master's degrees conducted clinical interviews with the Korean version of the Structured Clinical Interview for DSM-5 Disorders Clinician Version (SCID-5-CV) (First et al., 2016/2017), and the history of deliberate self-harm was explored. The self-harm variable was rated dichotomously to indicate whether self-harm had occurred. Patients were asked two questions: "Have you ever attempted suicide?" and "Have you ever harmed yourself?", to be answered, and the ones who answered "yes" to either one of the questions were coded to indicate the presence of past history of self-harm. Patients who answered "no" to both questions were considered to have no history of self-harm.

## Statistical analysis

We analyzed descriptive statistics of participant characteristics and correlations between anxiety sensitivity, rumination, and self-harm using IBM SPSS version 20.0 (IBM: Armonk, NY, USA) and conducted mediational analyses using Hayes' Macro Process version 3.5 in SPSS 20.0 (Hayes, 2012). Using simple mediation, we investigated the mediating effect of global rumination on the path from anxiety sensitivity to self-harm. Serial mediation analysis was used to examine the sequential relationship between reflection and brooding and their mediating role in relation to anxiety sensitivity and self-harm. Additionally, we explored the simple and sequential mediating effects of rumination on each subscale of anxiety sensitivity. Age and sex were entered as covariates in the mediation analysis. Statistical significance was set to less than 0.05.

## Procedures

We retrospectively collected data on psychological assessments administered to inpatients and outpatients at a university hospital located in Seoul, South Korea, from December 2020 to September 2021. Of the 166 data collected, 148 were used in the final analysis. All research procedures were approved by the Institutional Review Board (IRB, file number 2021-09-024-001) of Hanyang University Medical Center. As this research was a retrospective chart review study, the requirement for consent was waived by the IRB committee.

## Results

### Descriptive statistics

Seventy-two patients reported engaging in self-harm at least once in their lifetime (48.6%), whereas 76 patients reported no history of self-harm (51.4%). Of the 72 patients who reported a history of self-harm, 22 patients (30.6%) had only reported a history of suicide attempts without NSSI, 25 patients (34.7%) had only reported a history of NSSI without suicide attempt, and the remaining 25 patients (34.7%) had a history of both suicide attempts and NSSI.

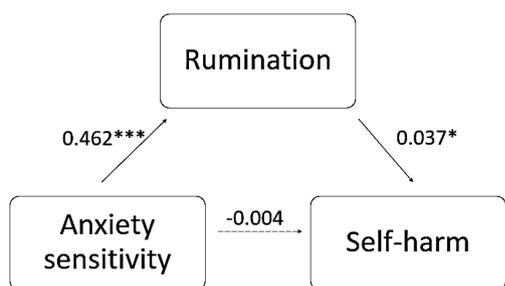
### Correlational analysis

The correlations among the variables used in this study are listed in Table 1. Anxiety sensitivity, rumination, and their subscales showed strong correlations with each other (all  $p < 0.01$ ). Self-harm was positively correlated with cognitive ( $p < 0.05$ ) and social ( $p < 0.05$ ) subscales of anxiety sensitivity, global rumination ( $p < 0.01$ ),

**Table 1.** Descriptive and Correlational Analysis ( $N = 148$ )

	Self-harm	ASI-3	Cognitive	Social	Physical	RRS	Reflection	Brooding
Self-harm	-							
ASI-3	0.148	-						
Cognitive	0.177*	0.888**	-					
Social	0.163*	0.850**	0.668**	-				
Physical	0.036	0.823**	0.587**	0.524**	-			
RRS	0.292**	0.636**	0.649**	0.562**	0.411**	-		
Reflection	0.161	0.427**	0.476**	0.361**	0.249**	0.804**	-	
Brooding	0.341**	0.567**	0.564**	0.509**	0.376**	0.872**	0.548**	-
<i>M</i>	0.487	35.007	12.446	13.000	9.561	61.601	14.730	17.885
<i>SD</i>	0.502	19.349	8.017	7.173	7.453	14.690	4.432	4.739

Note. ASI-3 = Anxiety Sensitivity Index-3; RRS = Ruminative Response Scale.  
\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .



**Figure 1.** A simple mediation analysis of anxiety sensitivity on self-harm via rumination (N = 148).

Note. The path coefficients are unstandardized. Sex and Age were also included as covariates. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

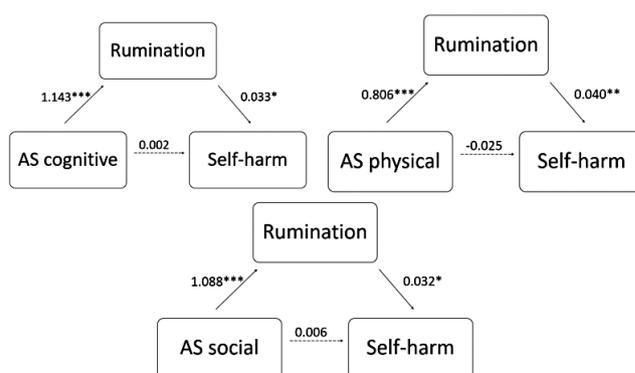
and brooding ( $p < 0.01$ ), and showed a trend of correlation with reflection ( $p = 0.051$ ). However, it was not significantly correlated with the physical subscale ( $p = 0.667$ ) of anxiety sensitivity.

**Mediational analyses**

Mediation effect of rumination in the relationship between anxiety sensitivity and self-harm

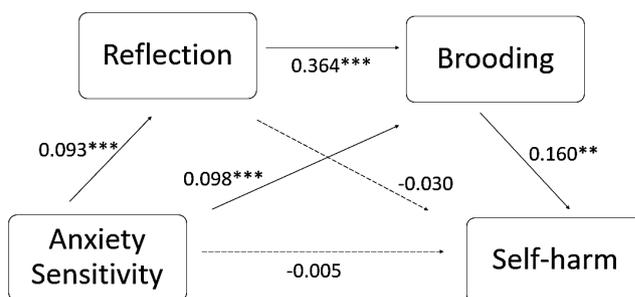
Simple mediation examining the indirect effect of anxiety sensitivity on self-harm via rumination, controlling for age and sex, was conducted, as depicted in Figure 1. The overall model was statistically significant ( $p < 0.01$ ). Global anxiety sensitivity predicted rumination ( $b = 0.462$ ,  $SE = 0.047$ ,  $p < 0.01$ ) and rumination significantly predicted self-harm ( $b = 0.037$ ,  $SE = 0.017$ ,  $p < 0.05$ ). In this model, the direct effect of anxiety sensitivity on self-harm is not statistically significant ( $p = 0.756$ ). However, the indirect effect of anxiety sensitivity on self-harm via rumination was significant (indirect effect = 0.0174,  $Boot SE = 0.008$ , 95% CI [0.0018, 0.0352]). The results showed that global anxiety sensitivity and self-harm were fully mediated by rumination.

We extended the analyses by investigating how the subfactors of anxiety sensitivity predicted self-harm through rumination (see Figure 2). Similar to the prior analysis conducted with global anxiety sensitivity, two of the three subfactors, cognitive (indirect effect = 0.038,  $Boot SE = 0.025$ , 95% CI [0.0022, 0.1009]) and physical concerns (indirect effect = 0.032,  $Boot SE = 0.017$ , 95% CI [0.0087, 0.0755]), indirectly predicted self-harm via rumination. However, rumination did not have a mediating effect on the relationship between social concerns and self-harm (indirect effect = 0.035,  $Boot SE = 0.019$ , 95% CI [-0.0001, 0.0767]).



**Figure 2.** Simple mediation analyses of three subfactors of anxiety sensitivity on self-harm via rumination (N = 148).

Note. AS = anxiety sensitivity; The path coefficients are unstandardized. Sex and Age were also included as covariates. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .



**Figure 3.** A serial mediation analysis of anxiety sensitivity on self-harm via reflection and brooding (N = 148).

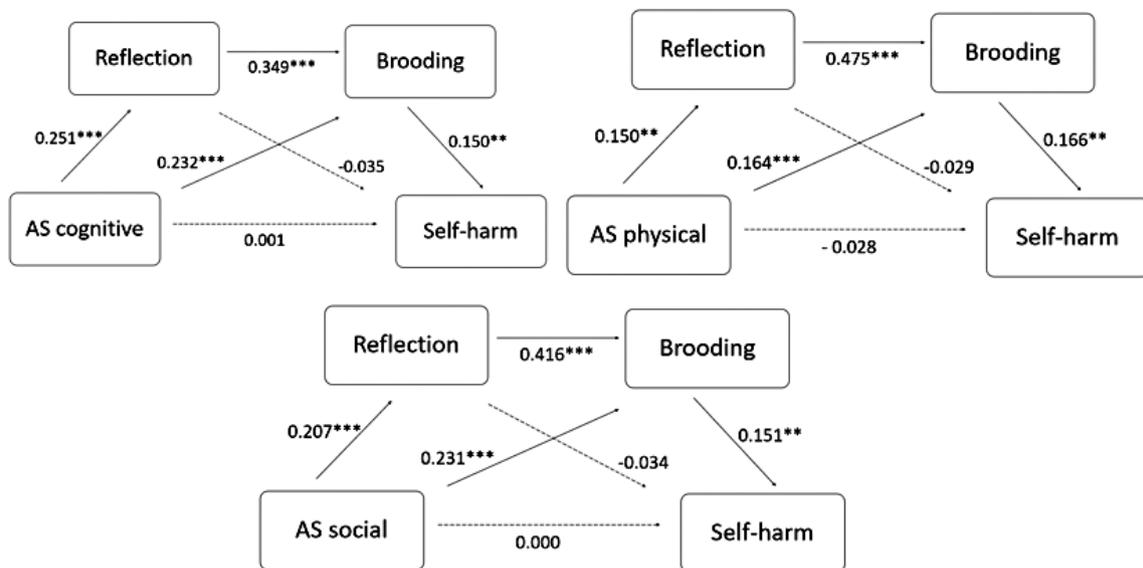
Note. The path coefficients are unstandardized. Sex and Age were also included as covariates. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

Serial mediation effect of reflection and brooding in the relationship between anxiety sensitivity and self-harm  
 Serial mediation analysis was performed with reflection preceding brooding as a mediator after controlling for age and sex. As Figure 3 shows, no direct effect of anxiety sensitivity on self-harm was found ( $b = -0.005$ ,  $SE = 0.012$ ,  $p > 0.05$ ). Anxiety sensitivity predicted reflection ( $b = 0.093$ ,  $SE = 0.017$ ,  $p < 0.01$ ), yet reflection did not predict self-harm ( $b = -0.030$ ,  $SE = 0.050$ ,  $p > 0.05$ ). No indirect effect of anxiety sensitivity on self-harm via reflection was found (indirect effect = -0.003,  $Boot SE = 0.005$ , 95% CI [-0.0134, 0.0072]). Meanwhile, anxiety sensitivity predicted brooding ( $b = 0.098$ ,  $SE = 0.017$ ,  $p < 0.01$ ) and brooding predicted self-harm ( $b = 0.160$ ,  $SE = 0.054$ ,  $p < 0.01$ ). The indirect effect of anxiety sensitivity on self-harm via brooding was significant (indirect effect = 0.016,  $Boot SE = 0.007$ , 95% CI [0.0055, 0.0314]). Finally, the path from

**Table 2.** Indirect Effect of the Subfactors of Anxiety Sensitivity on Self-harm Via Reflection and Brooding (N = 148)

Path	Indirect effect	Boot SE	95% CI	
			LLCI	ULCI
AS Cognitive → Reflection → Self-harm	-0.008	0.015	-0.0409	0.0194
AS Cognitive → Brooding → Self-harm	0.035	0.019	0.0107	0.0826
AS Cognitive → Reflection → Brooding → Self-harm	0.013	0.007	0.0033	0.0285
AS Social → Reflection → Self-harm	-0.007	0.011	-0.0314	0.0154
AS Social → Brooding → Self-harm	0.035	0.018	0.0090	0.0781
AS Social → Reflection → Brooding → Self-harm	0.013	0.006	0.0032	0.0278
AS Physical → Reflection → Self-harm	-0.004	0.010	-0.0260	0.0140
AS Physical → Brooding → Self-harm	0.027	0.015	0.0080	0.0655
AS Physical → Reflection → Brooding → Self-harm	0.012	0.007	0.0023	0.0285

Note. AS = anxiety sensitivity; CI = confidence interval; LLCI = lower limit confidence interval; ULCI = upper limit confidence interval.



**Figure 4.** Serial mediation analyses of the subfactors of anxiety sensitivity on self-harm via reflection and brooding (N = 148). Note. AS = anxiety sensitivity; The path coefficients are unstandardized. Sex and Age were also included as covariates. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

reflection to brooding ( $b = 0.364$ ,  $SE = 0.074$ ,  $p < 0.01$ ) and the sequential mediating effect of reflection and brooding were also significant. The path where high anxiety sensitivity led to increased reflection, which in turn was related to increased brooding and ultimately self-harm, was significant (indirect effect = 0.005, Boot  $SE = 0.003$ , 95% CI [0.0016, 0.0112]). Thus, our hypothesis that reflection and brooding would serially mediate the relationship between anxiety sensitivity and self-harm was supported.

In addition, we examined the same path with the subfactors of anxiety sensitivity established as predictors (see Table 2 and Figure 4). The results showed that all three subfactors showed similar trends in that reflection and brooding sequentially mediated the

relationship between cognitive concerns and self-harm (indirect effect = 0.013, Boot  $SE = 0.007$ , 95% CI [0.0033, 0.0285]), social concerns and self-harm (indirect effect = 0.013, Boot  $SE = 0.006$ , 95% CI [0.0032, 0.0278]), and physical concerns and self-harm (indirect effect = 0.012, Boot  $SE = 0.007$ , 95% CI [0.0023, 0.0285]), respectively. These results indicate that reflection and brooding serially mediate the relationship between all the subfactors of anxiety sensitivity and self-harm.

## Discussion

In the current study, we examined how anxiety sensitivity and

self-harm are related by exploring the mediating effect of rumination and further investigating the sequential mediating effects of reflection and brooding. These results suggest that psychiatric patients with high anxiety sensitivity are more vulnerable to self-harming behaviors when using rumination as an emotion regulation strategy. A meta-analysis by Rogers and Joiner (2017) showed that suicide attempts were associated with global rumination and brooding, but not reflection; the current study found that global rumination and brooding, but not reflection, mediated the relationship between anxiety sensitivity and self-harm. However, the path from anxiety sensitivity and self-harm was also sequentially mediated by reflection and brooding, suggesting that for psychiatric patients with high anxiety sensitivity, the positive aspects of reflection do not persist and deteriorate into pessimistic and passive forms of negative thoughts.

Studies on suicide have focused on brooding as a maladaptive coping strategy, whereas reflection has been frequently reported as a problem-solving method (Burwell & Shirk, 2007; Surrence et al., 2009). However, numerous studies have presented evidence that reflection does not always lead to positive outcomes and is often related to maladaptation (Fresco et al., 2002; Joormann et al., 2006). Miranda and Nolen-Hoeksema (2007) argued that both brooding and reflection were associated with suicidal ideation over time. Additionally, Yang et al. (2021) and Kim and Kang (2022) suggested that using reflection to solve problems does not guarantee positive outcomes, especially in crises. The results of the current study align with previous findings because they suggest that reflection consequently degenerates into brooding and lead to a failure in preventing self-harm. It can be inferred that even when anxiety-sensitive individuals with psychiatric disorders use reflection in distressing situations, their cognitive processes do not yield productive outcomes. To elucidate how reflection degenerates into brooding, certain mechanisms were considered.

People with high anxiety sensitivity have elevated negative urgency and thus tend to try to eliminate distress as quickly as possible (Whiteside & Lynam, 2001). In other words, they have a low threshold for tolerating negative emotions in stressful situations and tend to engage in coping behaviors actively. In particular, tolerating distressing emotions can be even more challenging for individuals with a clinical level of psychological symptoms. With

the desire to alleviate distress but a lack of mature coping skills, people are likely to engage in easy ways to regulate emotions. Moreover, owing to their attentional bias to negative and threatening stimuli (Hunt et al., 2006; Schoth et al., 2016), individuals with high anxiety sensitivity may effortlessly initiate rumination. Attentional bias can also be further reinforced by the poor executive functioning of ruminators, as monitoring, shifting, and updating information become difficult and negative thoughts remain in working memory for a longer time (Joormann, 2010; Koster et al., 2011). Moreover, endeavors to use reflection to solve problems can develop into impotent means in vulnerable populations, and shifting attention to positive stimuli would become demanding. Consequently, this inflexibility in cognition could generate fixation on negative information, which could cause an initially goal-oriented approach to be converted into maladaptive rumination, such as brooding.

As the current study shows, people with high anxiety sensitivity tend to form devastating thoughts in stressful situations and often use cognitive coping skills to reduce their distress. According to Righi et al. (2009), anxious, less self-confident individuals tend to self-evaluate at the cognitive level, which can exacerbate their stress levels. Teasdale (1999) suggested that self-focus has differential modes, and the conceptual-evaluative self-focus mode of thought processing impedes recovery from distressing events, while non-evaluative and experiential self-focus helps people narrow down their concerns (Teasdale, 1999; Watkins & Teasdale, 2004). With susceptibility, psychiatric patients with high anxiety sensitivity may attempt to evaluate why problems occur while reflecting, which in turn can be an ineffective strategy for alleviating negative emotions. Consequently, this can result in brooding about the problem, and with insufficient coping skills, the risk of self-harm could increase.

Despite the conceptual complexity of the two subtypes of rumination, both subtypes proceed as cognitive processes to regulate emotions in situations with negative emotions. According to Martin and Tesser's (1996) control theory, rumination occurs when there is an unsatisfied goal that needs to be pursued. When there is a discrepancy between the status quo and what one desires, information on what one wants to achieve becomes easily accessible (Zeigarnik, 1938). State rumination is easily activated to pursue

one's goals (Martin & Tesser, 1996). Based on this goal progress concept of control theory, rumination can be seen as self-regulation, as one accesses goal-related information and initiates problem-solving (Wells & Matthews, 1994). This conceptualization is somewhat relevant to reflection, which involves pondering problem-solving to overcome distressing emotions concomitant with unfulfilled desires (Treyner et al., 2003). Although it appears plausible, with some factors that impede successful problem solving, the positive functions of reflection may not prevail. For reflection to function adaptively, individuals should be equipped with effective coping skills. However, considering that the participants were patients at a university hospital experiencing clinical distress, it is likely that they were not capable of using coping strategies effectively. Considering that anxiety sensitivity is strongly associated with perfectionism (Flett et al., 2004), patients with high anxiety sensitivity are likely to have extremely high standards. As perfectionists have goals that are difficult to achieve, the discrepancy between reality and the ideal cannot easily diminish. Rumination and perfectionism have shown a strong positive correlation (Randles et al., 2010; Xie et al., 2019). Because unrealistic goals are hard to process concretely by focusing on 'how' to do the action, one tends to ruminate with an abstract processing style, focusing on 'why' things have happened (Watkins, 2008) with no constructive means to resolve problems. Furthermore, abstract processing in rumination sustains problem-solving deficits, which depletes resources needed to cope with stress or to work through problems, prolonging the state of distress, as thoughts about unresolved goals linger longer than solved goals (Zeigarnik, 1938). The enduring discrepancy between reality and expectation may amplify negative affect as people passively compare the situation they are currently facing to the ideal standards, initiating brooding (Watkins, 2008).

The results of the current study suggest that all three aspects of anxiety sensitivity (i.e., cognitive, social, and physical concerns) explain the heightened risk of self-harm via reflection and brooding. Patients with high cognitive concerns fear losing control and find death the ultimate solution (Capron et al., 2012). Moreover, patients with social concerns may fear being secluded from their social environment (Joiner et al., 2009), and ruminating about isolation can lead to increased self-harm. These results are compara-

ble to the interpersonal theory of suicide by Joiner (2005), in which the false beliefs in one's situation, such as perceived burdensomeness and thwarted belongingness, are crucial factors in predicting suicide. In the current study, physical concerns also led to a high risk of self-harm through reflection and brooding. Interestingly, the results on physical concerns were not in agreement with previous studies that asserted that a high pain threshold, especially when combined with fear of losing mind capacity, often precedes suicide attempts and NSSI (Brown et al., 2002; Kirtley et al. 2016; Orbach et al., 1996). A positive association between physical pain and suicide risk has been repeatedly reported, and insensitivity to pain has even led to reduced participation in reward-driven activities (Rizvi et al., 2017). The results of this study, where high physical concerns also predicted self-harm via rumination, suggest that experiencing more concerns about physical sensation does not always mean having a low pain threshold. Physical concerns involve cognitive processes such as the fear of catastrophic events in the presence of physical sensations. Thus, high physical concerns may lead to high cognitive concerns and ultimately, a heightened risk of self-harm.

From a therapeutic perspective, cognitive interventions should be introduced with caution in psychiatric patients with high anxiety sensitivity. As patients with high anxiety sensitivity are not equipped with flexible mental capacity, vaguely asking clients to seek solutions may not be effective. Therefore, more sophisticated interventions targeting diverse aspects of rumination should be used to prevent self-harm in patients with high anxiety sensitivity. Cognitive behavioral therapies specifically targeting rumination, or rumination-focused CBT have been developed for individuals with habitual rumination (Watkins et al., 2007). In this approach, functional analysis is used to help clients systemically understand when and how rumination occurs by examining context, along with the antecedents and consequences of rumination (Watkins & Roberts, 2020). In addition, functional analysis helps individuals learn how to differentiate between helpful and non-helpful thinking styles; alongside imagery techniques, behavioral experiments, and experiential approaches, it provokes a concrete thinking style, thereby further reducing discrepancies between reality and expectations. Cognitive bias modification also helps develop a concrete thinking style by asking clients "how" questions in different re-

recorded scenarios (Hertel et al., 2014). Such therapeutic interventions, designed to reduce abstract thinking styles and improve concrete processing, have shown effectiveness in reducing rumination (Jacobs et al., 2016). Moreover, because rumination is worsened by the belief that it is useful in reducing distress, metacognitive training could be considered to challenge this belief (Wells, 2011). In this process, clients are trained to shift their attention from the internal self to external stimuli (Papageorgiou & Wells, 2009). Similarly, mindfulness skills are highly recommended for developing alternatives to negative thoughts and emotions, implying that accepting unpleasant feelings and maintaining awareness can be helpful in reducing rumination (Segal et al., 2002). Both techniques operate as attention shift from self-focused negative stimuli to other stimuli. Additionally, adapting mindfulness-based programs can increase cognitive flexibility, which, in turn, may reduce avoidant behaviors and even lower anxiety sensitivity (Alimehdi et al., 2016; Hamill et al., 2015; Marshall et al., 2010). When positive reappraisal is combined with mindfulness, it can be more beneficial than reappraisal alone (Pogrebtsova et al., 2018). Perhaps an inference can be made that practicing mindfulness may amplify the practical aspects of reflection and help with successful emotion regulation.

This study had some limitations. First, we used a dichotomous variable to measure self-harm; other dimensions of self-harm, such as frequency, intensity, or forms of self-harm, were not assessed or analyzed in this study. Thus, more research is needed to clarify how anxiety sensitivity and rumination are interrelated with the various features of self-harm. Second, this study was cross-sectional. Future studies can longitudinally track changes in rumination and how they affect self-harming behaviors. Additionally, most of the sample comprised patients with depressive disorders; thus, the generalizability of the results to other types of psychiatric patients should be considered with caution.

Nonetheless, this study contributes to the literature as it is the first to demonstrate how anxiety sensitivity predicts self-harm sequentially via reflection and brooding among psychiatric patients. Although few studies have targeted the clinical population, this study adds empirical support for the risk factors of self-harm, such as anxiety sensitivity, brooding, and reflection in the clinical literature. Additionally, it has the strength of measuring self-harm

with reported histories of self-harming behavior in the clinical interview, which improved the validity of the outcome variable. Finally, based on the findings of this study, future research should further investigate the factors that increase the risk of self-harm in people with high levels of anxiety sensitivity and develop suitable interventions targeting the clinical population.

### Author contributions statement

Jiyoung Hong, M.A., a former clinical psychology resident at Hanyang University Seoul Hospital, conceived and designed the study, collected data, analyzed data, and drafted the original manuscript. Seok Hyeon Kim, M.D. and Sungwon Roh, M.D., professors at Hanyang University Seoul Hospital, contributed to the data collection and reviewed and edited drafts. Sojung Kim, Ph.D., a licensed clinical psychologist at Hanyang University Seoul Hospital, conceived and designed the study, collected and analyzed data, provided resources, and reviewed and edited drafts as the principal supervisor of research. All the authors provided critical feedback, participated in the revision of the manuscript, and approved the final submission.

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## **Original Articles**

- Bidirectional Processes between Interparental Conflict and Children's Negative Emotionality in Early Childhood: Predicting School-Age Problem Behavior
- The Effect of Compartmentalization of Other-concept on Depression
- Differential Effects of Reflection and Brooding on the Relationship Between Anxiety Sensitivity and Self-harm: A Serial Mediation Study

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