



# The Role of Event-Related Rumination and Perceived Social Support on Psychological Distress during the COVID-19 Pandemic: Results from Greater Daegu Region in South Korea

Hyo Shin Kang<sup>1</sup> and Bin-Na Kim<sup>2</sup>

<sup>1</sup>Department of Psychology, Kyungpook National University, Daegu, Republic of Korea

<sup>2</sup>Department of Psychology, Gachon University, Seongnam, Republic of Korea

**Objective** Research on psychological distress from the coronavirus disease 2019 (COVID-19) crisis has increased significantly, but the factors that can exacerbate or mitigate such distress have remained underexplored. To address the research gap, this study examined whether two types of rumination and perceived social support predict psychological distress during the pandemic.

**Methods** Participants were recruited from communities of the greater Daegu area (n=316) where the first massive outbreak in South Korea occurred and most residents underwent substantial disruption of daily life. They completed self-report questionnaires that included measures of psychological distress, event-related rumination, and social support.

**Results** The hierarchical regression analysis showed that maladaptive intrusive rumination and perceived social support predicted increases and decreases in psychological distress, respectively, even when subjective severity of COVID-19-related experiences was controlled. Putatively adaptive type of rumination (i.e., deliberate rumination) was not a significant predictor concurrently.

**Conclusion** This is among the early endeavors to comprehensively understand risk and protective factors associated with an effective coping strategy against the COVID-19 crisis. Our results indicate that intrusive rumination aggravates but social support mitigates psychological distress during the pandemic, indicating that we can better adapt by differently attending to recent experiences and maintaining perceived social support.

**Psychiatry Investig 2021;18(5):392-399**

**Key Words** COVID-19, Mental health, Intrusive rumination, Social support.

## INTRODUCTION

The coronavirus disease 2019 (COVID-19) first appeared in late 2019 and rapidly spread over several countries and continents, leading to an unprecedented global crisis in the 21st century. On March 11, 2020, the World Health Organization (WHO) officially declared it as a global pandemic.<sup>1,2</sup> Unfortunately, COVID-19 has remained an emerging and evolving situation. As of November 8, 2020, more than 49.7 million confirmed COVID-19 cases and 1.2 million deaths had been reported globally since the start of the pandemic.<sup>3</sup> And experts

have warned of an even steeper increase in the infection rates during the winter in the Northern Hemisphere.<sup>4</sup>

COVID-19 has drastically disrupted every aspect of human life. It has threatened not only the physical health but also the psychological well-being of people.<sup>5,6</sup> During the early phase of COVID-19 crisis, the lack of an effective pharmacological treatment and vaccines has led many countries to enforce social distancing to keep people safe and prevent the spread of virus. The COVID-19 outbreak itself and such measures taken to bring it under control have been highly stressful for many people.<sup>7,8</sup>

This problem immediately drew considerable research attention, which resulted in numerous published articles on the COVID-19 crisis.<sup>5</sup> Overall, previous research has suggested that the widespread outbreak of infectious diseases, such as COVID-19, is associated with a wide range of mental health problems, including anxiety, depression, stress, and post-traumatic stress disorder (PTSD).<sup>1,9-15</sup> For example, Xiong et al.<sup>6</sup> reported higher rates of various mental health problems in the

**Received:** December 28, 2020 **Revised:** January 20, 2021

**Accepted:** January 26, 2021

**Correspondence:** Bin-Na Kim, PhD

Department of Psychology, Gachon University, 1342 Seongnam-daero, Sujeong-gu, Seongnam 13120, Republic of Korea

**Tel:** +82-31-750-5264, **Fax:** +82-31-750-5174, **E-mail:** shinebinna@gachon.ac.kr

© This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

general population and associated risk factors (e.g., gender, unemployment, frequent exposure to news/social media related to COVID-19). And Kujawa et al.<sup>13</sup> found that stressful events due to the COVID-19 were moderately correlated with symptoms of depression and anxiety both cross-sectionally and longitudinally among American adults. Furthermore, in a randomized controlled trial, Li et al.<sup>15</sup> attempted to test whether providing cognitive behavioral therapy in addition to routine medical treatment may help reduce depression, anxiety symptoms for COVID-19 patients in China.

However, most of the COVID-19-related mental health articles have relied on participants from China, the United States, and India, and data from the South Korean population is still limited. Moreover, not everyone experiencing a sudden stressor like COVID-19 presents negative outcomes. Although existing studies on the mental health consequences of the COVID-19 crisis have contributed to our increased understanding in a timely manner, now there is an increasing call for studies that will inform us on how to adapt to this prolonged stress. To better understand the individual differences in coping with the pandemic, researchers should shift their focus toward factors that can exacerbate or mitigate psychological distress during the COVID-19 crisis.

One such factor is rumination, defined as repetitively and passively focusing on negative thoughts; a substantial body of literature indicated that it is a transdiagnostic risk factor that exacerbates and prolongs the impact of stressors, resulting in various psychological problems, such as depression and anxiety.<sup>16,17</sup> In addition, rumination has been associated with the development and persistence of PTSD symptoms as a response to accidents<sup>18</sup> or natural disasters.<sup>17,19</sup> More recently, researchers have investigated whether the adverse effects of rumination apply to mental health problems experienced during the COVID-19 pandemic. For example, Hoffart et al.<sup>20</sup> found that rumination and worry in general were positively associated with greater loneliness among Norwegian participants who were observing social distancing. Similarly, Ye et al.<sup>21</sup> found that rumination partially mediated the relationship between stressors of COVID-19 and stress consequences among Chinese university students.

Here it is worth noting that rumination is not a unitary construct but rather a multifaceted one that is composed of functionally differential sub-factors.<sup>22</sup> Especially, Cann et al.<sup>23</sup> proposed the importance of distinguishing the two types of “event-related” rumination, which is most relevant to this study. They regarded ruminations as cognitive processes that are involved in the aftermath of traumatic or stressful life events, which have different implications for determining the psychological impact of events. Intrusive rumination is characterized by the involuntary invasion of repetitive thoughts about the event

into awareness. By contrast, deliberate rumination entails a more problem-focused cognitive process to make meaning of the event. Although intrusive and deliberate ruminations are both a “normal by-product” (p. 139)<sup>23</sup> that can manifest in a person’s struggles in times of major life crises, the former is likely to lead to continued distress and failed coping while the latter is related to post-traumatic growth over time.<sup>23,24</sup> Therefore, the distinction between the two types of ruminative thoughts and their implication for subsequent outcomes must be considered when examining how rumination affects one’s psychological response to the COVID-19 crisis, a sudden, major life stressor that can provoke considerable cognitive processing.

Social support is another important protective factor that may be associated with psychological distress during the COVID-19 pandemic. Perceived social support is defined as perceived availability and adequacy of the general availability of support and/or global satisfaction with the support provided.<sup>25</sup> There are varying views on the concept of perceived social support; however, they generally indicate that the concept refers to individuals’ perception of the availability of social support than objective elements (e.g., network size) or what is actually received.<sup>26</sup> Moreover, many studies have indicated that the perception of social bonds and supportive relationships with others are vital for not only people’s mental health but also protecting them in the face of adversity.<sup>27,28</sup> The lack of social support was also found to increase the probability of psychological distress, including depression.<sup>26,29</sup> Recent studies have begun to document the meaningful role that perceived social support plays in coping with the COVID-19 pandemic.<sup>30,31</sup> For example, Labrague and De los Santos<sup>32</sup> observed that resilient nurses who perceived higher social support were more likely to report lower COVID-19-related anxiety. Also, Li et al.<sup>33</sup> reported that social support has a negative relation with psychological symptoms during the COVID-19 pandemic among Chinese university students. The role of social support as a coping resource is highlighted during the COVID-19 pandemic when social distancing has been implemented as a preventive strategy to reduce direct interpersonal contacts; this measure may deteriorate people’s sense of social support.

The major aim of this study was to examine whether the two types of event-related rumination and perceived social support influence psychological distress during the COVID-19 crisis. Participants in this study were adults living in greater Daegu area, where the first massive outbreak in South Korea occurred and most residents went through severe restrictions in daily life due to COVID-19. We hypothesized that intrusive rumination and perceived social support would predict increases and decreases in psychological distress, respectively. At this point, there was not enough backgrounds for specifying the concurrent relation between deliberate rumination

and distress.<sup>23</sup> Nonetheless, we included deliberate rumination for an exploratory purpose and expected a differential pattern of relationship of deliberate rumination with other variables in comparison to intrusive rumination.

## METHODS

### Participants

Data were collected from community-dwelling residents of Daegu and Gyeongsangbuk-do Province in South Korea using an online questionnaire in early August 2020. We recruited a representative sample of residents in terms of age and gender to enhance generalizability of this study. The number of participants totaled 316 adults aged 20 years or older; all were included in subsequent analyses. Half (50.6%) were female and participants' age ranged from 20 to 73 years ( $M=43.28$ ,  $SD=12.61$ ). All procedures and materials were approved by the Institutional Review Board of Kyungpook National University (KNU-2020-0054). An online informed consent was obtained from all participants. Sample characteristics are presented in Table 1.

### Measures

#### Subjective severity

Two questions, which were originally suggested by García et al.,<sup>19</sup> were revised to assess the subjective severity of COVID-19-related experiences: "To what degree do you feel your life was disrupted as a result of COVID-19?" and "To what degree do you rate COVID-19 as a traumatic experience to your life?" These two questions were scored using a 5-point Likert scale, ranging from 1 ("not at all") to 5 ("extremely"). They were moderately correlated ( $r=0.39$ ,  $p<0.001$ ).

#### Korean-Brief Symptom Inventory (K-BSI)

The BSI-18 is a self-report questionnaire use for conveniently assessing psychological distress with limited number of items.<sup>34</sup> The K-BSI was administered in this study.<sup>35</sup> It consists of 18 items rated on a 5-point Likert scale (from 1=not at all to 5=very much). The K-BSI contains three subscales (i.e., depression, anxiety, and somatization), each composing of six items. We used the total score of the three subscales [global severity index (GSI)] as an index for the general level of psychological distress. A higher score indicated greater psychological distress. The internal consistency in the present study was excellent (Cronbach's  $\alpha=0.95$ ).

#### Korean version of the Event-related Rumination Inventory (K-ERRI)

The ERRI was developed to separately assess the two types

**Table 1.** Sample characteristics (N=316)

	Mean	SD	N (%)
Age	43.28	12.61	
Gender			
Male			156 (49.4)
Female			160 (50.6)
Residence			
Daegu			220 (69.6)
Gyeongsangbuk-do			96 (30.4)
Subjective severity			
Disruption in daily life	3.84	0.78	
Perceived traumatic experience	2.94	0.10	
COVID-19-related experience			
Diagnosis confirmed			1 (0.3)
Diagnosis of family or close friends			31 (9.8)
Screening test			42 (13.3)
Self-quarantine			23 (7.3)
Education			
University			239 (75.7)
High school			74 (23.4)
Middle school			3 (0.9)
Marital status			
Unmarried			117 (37.0)
Married or cohabiting			175 (55.4)
Divorced			20 (6.3)
Bereaved			4 (1.3)

of rumination related to a stressful life event: intrusive and deliberate rumination.<sup>23</sup> The K-ERRI was used in this study.<sup>36</sup> Participants were asked to respond to 10 items that measure intrusive rumination (e.g., "I thought about the event when I did not mean to") and another 10 items for deliberate rumination (e.g., "I thought about whether I could find meaning from my experience"). The items were rated on a 4-point Likert scale (from 0=not at all to 3=often). A higher score indicated higher levels of intrusive and deliberate rumination. To specifically capture event-related ruminations in response to the pandemic, we slightly changed the wording of the phrase "during the weeks immediately after the event" to "during COVID-19." In this way, participants would answer each item in relation to their recent COVID-19-related experiences. Internal consistencies of both subscales were excellent (Cronbach's  $\alpha$ : intrusive rumination=0.96, deliberate rumination=0.92).

#### Social support

The Perceived Social Support Scale was used to assess the extent to which an individual perceives social support.<sup>37</sup> The scale consists of 25 items rated on a 5-point Likert scale (from

1=not at all to 5=very much) and covers four dimensions: emotional, material, informational, and evaluative social support. In this study, we used the total score to determine the general level of perceived social support. Internal consistency was within an excellent range (Cronbach's  $\alpha=0.97$ ).

### Statistical analyses

After descriptive statistics, we conducted correlational analyses to examine the relationship of the main variables, namely, psychological distress, event-related rumination, and social support. Next, a hierarchical regression analysis was performed to examine the predictors of psychological stress. To demonstrate the incremental variance explained by intrusive rumination, deliberate rumination, and perceived social support in Step 2, two variables of subjective severity were entered as independent variables to be controlled in Step 1. Statistical analyses were carried out using SPSS ver. 24.0 (IBM Corp, Armonk, NY, USA).

## RESULTS

### Descriptive statistics

On average, participants reported having experienced considerable disruption in daily life ( $M=3.84$ ,  $SD=0.78$ ) owing to COVID-19 and rated COVID-19 as a traumatic experience of moderate severity ( $M=2.94$ ,  $SD=0.10$ ). One participant (0.3%) was diagnosed with COVID-19 and 31 (9.8%) had family members or close friends who were diagnosed with the disease. About 20% of the participants underwent a screening test or self-quarantine, suggesting a widespread infection within the community at that time.

### Correlational analyses of the main variables

As can be seen in Table 2, both types of event-related rumination demonstrated significant positive correlation with psychological distress. The magnitude of correlation was larger in intrusive rumination ( $r=0.65$ ,  $p<0.001$ ) than in deliberate rumination ( $r=0.34$ ,  $p<0.001$ ). In partial correlation analyses in

which the other type of event-related rumination was controlled, the positive correlation between intrusive rumination and psychological distress remained significant (partial  $r=0.59$ ,  $p<0.001$ ). On the other hand, the significant relationship between deliberate rumination with psychological distress disappeared (partial  $r=-0.04$ , n.s.), indicating that the positive correlation might be due to the shared variance between two types of ruminations.

As predicted, social support was negatively correlated with psychological distress ( $r=-0.26$ ,  $p<0.001$ ). However, it showed a varying pattern of correlation with the two types of event-related rumination. It was significantly negatively associated with intrusive rumination ( $r=-0.20$ ,  $p<0.001$ ) but uncorrelated with deliberate rumination ( $r=0.07$ , n.s.).

### Hierarchical regression analysis predicting psychological distress

To consider the individual differences at a specific level of COVID-19-related stress, we controlled for two variables of subjective severity (i.e., disruption in daily life and perceived traumatic stress) in Step 1 in a series of hierarchical regression analysis (Table 3). The results of Step 2 indicated that intrusive rumination and social support had significant incremental variance in predicting psychological distress during the COVID-19 crisis ( $\Delta R^2=0.24$ ,  $p<0.001$ ); the amount of variance explained by the regression model was substantially large ( $R^2=0.51$ ,  $p<0.001$ ). Intrusive rumination or the maladaptive type of event-related rumination could predict increases in psychological distress ( $t=8.72$ ,  $p<0.001$ ), whereas social support would predict decreases in psychological distress ( $t=-4.12$ ,  $p<0.001$ ). Meanwhile, deliberate rumination was found to be insignificant in predicting psychological distress when other variables were jointly considered.

For an exploratory purpose, we repeated the hierarchical regression modeling using the same independent variables that predict depression, anxiety, or somatization, instead of the GSI, to see if this relation is robust across specific symptom contents. The results were identical; intrusive rumination was a

**Table 2.** Descriptive and correlation analyses (N=316)

	K-BSI	K-ERRI		Social support
		IR	DR	
K-BSI	-	0.65***	0.34***	-0.26***
K-ERRI		-		
Intrusive rumination (IR)			0.56***	-0.20***
Deliberate rumination (DR)			-	0.07
Mean	42.86	20.69	23.05	90.56
SD	15.22	7.62	6.40	16.12

\*\*\* $p<0.001$ . K-BSI: Korean-Brief Symptom Inventory, K-ERRI: Korean-Event Related Rumination Inventory

**Table 3.** Hierarchical regression predicting psychological distress (N=316)

Step	IV	B	SE	$\beta$	t	R <sup>2</sup>	$\Delta R^2$
1	SS 1	1.02	1.03	0.05	0.99	0.27***	
	SS 2	7.58	0.80	0.40	9.44***		
2	SS 1	0.02	0.86	0.00	0.03	0.51***	0.24***
	SS 2	4.67	0.72	0.31	6.47***		
	Intrusive rumination	0.96	0.11	0.48	8.72***		
	Deliberate rumination	-0.01	0.12	-0.00	-0.09		
	Social support	-0.16	0.04	-0.17	-4.12***		

\*\*\* $p < 0.001$ . SS: subjective severity (1=disruption in daily life, 2=perceived traumatic experience)

positive and the strongest predictor, whereas perceived social support was a negative predictor of each psychological symptom in Step 2. These findings indicate the generalizability of the results of the present study irrespective of symptom domain.

## DISCUSSION

The present study explored whether certain factors could explain the individual differences in coping with COVID-19 among residents of Daegu and Gyeongsangbuk-do, who underwent the first massive COVID-19 outbreak in South Korea. Specifically, we investigated how people perceived their COVID-19-related experiences (intrusive versus deliberate rumination) and whether their perceived social support could predict unique variances in psychological distress. Overall, the results supported our hypotheses. Intrusive rumination, or the maladaptive type of ruminative thinking, was positively associated with psychological distress, whereas social support was negatively associated with the latter.

An increasing amount of evidence has shown that the adverse impact of COVID-19 is not confined to physical health but extends to mental health issues.<sup>6</sup> As discussed earlier, there has been an urgent demand for research that target the factors of a successful coping strategy against COVID-19-related stress across various methodologies and populations. In other words, a collection of multidisciplinary and high-quality empirical data is the immediate priority.<sup>38</sup> To the best of our knowledge, our study is among the early endeavors to investigate the factors that can aggravate and ameliorate psychological distress caused by COVID-19. We think that this line of studies can pave the way to start the development of evidence-based mental health guidelines for the public by identifying both the risk and protective factors of an effective coping in times of the so-called “new normal.”

First, the way people think about their COVID-19-related experiences seemed to matter. Consistent with the previous literature, our study provides converging evidence that rumination may yield an increased level of psychological distress

as a response to the COVID-19 crisis. However, different from previous investigations, such as Ye et al.,<sup>21</sup> we used the ERRI, which was specifically designed to measure the role of rumination in the aftermath of traumatic or stressful events.<sup>23</sup> In the ERRI, rumination was divided into two distinct types that possess varying implications for subsequent adaptation. We found that intrusive rumination, and not deliberate rumination, plays a central role in exacerbating psychological distress, although both types of rumination were positively associated with psychological distress in pair-wise correlations. Considering that there was a large correlation between intrusive and deliberate ruminations ( $r=0.56$ ,  $p < 0.001$ ), their differential relationship with psychological distress in hierarchical regression is interesting.

A disruption in life and increased stress after the COVID-19 outbreak may naturally lead people to engage in repetitive thinking about what has been going wrong. In this case, the “how,” rather than the “how much,” they think about these stressors is more important. Our results suggest that people with heightened intrusive rumination are susceptible to more psychological distress. From a therapeutic perspective, it may be difficult to divert ruminators from a repetitive thinking pattern particularly when under stress.<sup>39</sup> A more realistic goal would be to guide them to deal with their internal thoughts in a more reflective and constructive way, exemplified by deliberate rumination.

In line with previous studies,<sup>21,30,31,40,41</sup> perceived social support was negatively associated with psychological distress and predicted an incrementally significant variance, even when subjective severity and different types of rumination were jointly considered. This finding suggests that perceived social support could mitigate the negative consequences of psychological distress during the COVID-19 crisis. Given that many scholars have consistently stressed the importance of social support for resilience and post-traumatic recovery,<sup>26-28</sup> it would be necessary to highlight that the current results on perceived social support are worth noting beyond a mere replication. The characteristic of COVID-19 as a novel, biomedical disas-

ter that is prevented through social distancing, which is a complete opposite of social support, creates a paradoxical condition for mental health.<sup>28</sup> This problem leaves researchers much to ponder for mental health care of post-COVID-19 era. Because of the highly contagious nature of COVID-19, coupled with a shortage of effective and safe vaccines, ensuring personal hygiene (e.g., hand washing and wearing of a mask) and reducing direct interpersonal contact are the only viable options for reducing the rate of infection. However, such necessary measure for prevention may result in unintended side effects in mental health, such as increased loneliness and isolation, which, in turn, are associated with poorer mental and physical health.<sup>42</sup>

Therefore, the next step in addressing the crisis should be to create ways to strengthen social support as psychological resources to effectively cope with this prolonged, global pandemic. Which component of social support (e.g., emotional, material, informational, evaluative social support) is more conducive to maintaining mental health in times of COVID-19? Is social support delivered online or by a virtual technology as effective as that delivered offline and through direct interpersonal contact? What is the active component or mechanism of buffering effect of social support in the face of pandemic? These questions can be a few starting points for future research that will inform mental health care guidelines during the COVID-19 crisis.

Lastly, we would like to emphasize that our results were obtained from a representative sample of adults living in Daegu and adjacent Gyeongsangbuk-do area, where residents underwent severe restrictions in daily life during the first major outbreak in South Korea from early to mid of 2020. Although a complete lockdown has not been executed as a governmental policy, as people who were tested positive for COVID-19 drastically increased specifically within these areas, mobility from and out of these regions was greatly diminished, and economic and social activities were profoundly hampered during that period. Unlike previous studies that used convenience sampling, our sample was stratified by age and gender to increase the ecological validity of the current findings. Additionally, considering that approximately half of the COVID-19-related mental health articles have relied on participants from China, the United States, and India,<sup>5,6</sup> our results supplement the existing gap by providing data from the South Korean population, where COVID-19 outbreak has been relatively under control and the majority of the population have shown high adherence to follow preventive regulations imposed on their daily routines, such as social distancing.<sup>43</sup>

### Limitations

Certain limitations should be noted. First, because this is a

cross-sectional study, it was not possible to directly examine the causality between variables. Therefore, directionality between rumination, social support, and psychological distress should be investigated in future studies employing longitudinal design. In particular, the impact of deliberate rumination, which did not concurrently predict psychological distress in our results, may vary across time and exert time-lagged protective effect.<sup>44</sup> Deliberate rumination is conceptualized as a putatively adaptive thinking style to make meaning of a problematic situation, elicited later in time by intrusive rumination.<sup>45,46</sup> That is, intrusive rumination tends to prevail especially in an earlier adaptation phase with its detrimental consequences; however, at the same time, it may facilitate increased deliberate rumination in the latter adaptation phase, at least, in some individuals. Thus, the relationship between these two event-related ruminations may be rather dynamic, unfolding with the passage of time, which cannot be properly captured cross-sectionally. The following questions may warrant testing in a separate study in the future: Will deliberate rumination prospectively predict differences in adaptation toward COVID-19? What could be the moderators of this relationship over time?

Second, although we tried to enhance ecological validity by recruiting community-dwelling residents in a severely affected region, the role of rumination and perceived social support should be examined in other samples as well for generalizability, especially those who are undergoing tremendous stress during the COVID-19 crisis. For instance, health professionals in the front lines are in dire need of mental health support.<sup>32</sup> Moreover, as Amerio et al.<sup>5</sup> argued, the current results should be replicated in vulnerable groups (e.g., individuals with pre-existing mental and/or health issues, older adults, children and adolescents, unemployed persons, and people under self-quarantine or lockdown) and other general population.

Third, reliance on self-report data is also a limitation. Although self-report measures are convenient tools for data collection, especially when participants are adults without literacy difficulty and when research topics deal with internal experiences that cannot be externally observed, which was the case in our study, they are susceptible to issues of certain reporting bias or social desirability. Therefore, subsequent studies would benefit from diversifying methods of data collection.

### Conclusions

In summary, the current study extends existing literature regarding rumination and social support by providing evidence that intrusive rumination exacerbates but social support may mitigate psychological distress in reaction to stress caused by the novel pandemic. Although no one can be absolutely free from COVID-19-related stress for the time being, our results suggest that we can still be buffered from psychological dis-

tress by differently attending to recent experiences and maintaining or improving perceived social support. In short, the impact of COVID-19 on mental health may not be equal to everyone, despite its ubiquitous presence worldwide. We hope that continued research with a refined focus on plausible risk and/or protective factors will contribute to a better understanding of how we can stay not only physically but also psychologically healthy throughout the prolonged pandemic, which will eventually serve as a sound basis for developing an evidence-based mental health guideline for COVID-19.

**Acknowledgments**

None.

**Conflicts of Interest**

The authors have no potential conflicts of interest to disclose.

**Author Contributions**

Author Hyo Shin Kang and Bin-Na Kim jointly participated in conceptualization, data collection, and statistical analysis. In draft writing, author Bin-Na Kim wrote the first draft of Introduction and Methods, and author Hyo Shin Kang wrote the first draft of Results and Discussion. Afterwards, the authors reviewed and edited the draft together, and approved of the final draft.

**ORCID iDs**

Hyo Shin Kang <https://orcid.org/0000-0001-8965-4278>  
 Bin-Na Kim <https://orcid.org/0000-0003-2667-193X>

**REFERENCES**

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. *Lancet* 2020;395:470-473.
2. World Health Organization (WHO). WHO Director-General's opening remarks at the media briefing on COVID-19-11 March 2020. Available at: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020>. Accessed March 11, 2020.
3. World Health Organization (WHO). Coronavirus. Available at: <https://www.who.int/publications/m/item/weekly-epidemiological-update--10-november-2020>. Accessed November 10, 2020.
4. Mallapaty S. Why COVID outbreaks look set to worsen this winter. *Nature News*. <https://www.nature.com/articles/d41586-020-02972-4>. Accessed November 21, 2020.
5. Amerio A, Odone A, Aguglia A, Gianfredi V, Bellini L, Bucci D, et al. La casa de papel: a pandemic in a pandemic. *J Affect Disord* 2020;277:53-54.
6. Xiong J, Lipsitz O, Nasri F, Lui LM, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J Affect Disord* 2020;277:55-64.
7. Lahav Y. Psychological distress related to COVID-19—The contribution of continuous traumatic stress. *J Affect Disord* 2020;277:129-137.
8. Taylor S, Landry CA, Paluszek MM, Asmundson GJ. Reactions to COVID-19: differential predictors of distress, avoidance, and disregard for social distancing. *J Affect Disord* 2020;277:94-98.
9. Bao Y, Sun Y, Meng S, Shi J, Lu L. 2019-nCoV epidemic: address mental health care to empower society. *Lancet* 2020;395:e37-e38.
10. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res* 2020;287:112934.
11. Odriozola-González P, Planchuelo-Gómez Á, Irurtia MJ, de Luis-García R. Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Res* 2020; 290:113108.

12. Kontoangelos K, Economou M, Papageorgiou C. Mental health effects of COVID-19 pandemic: a review of clinical and psychological traits. *Psychiatry Investig* 2020;17:491-505.
13. Kujawa A, Green H, Compas BE, Dickey L, Pegg S. Exposure to COVID-19 pandemic stress: associations with depression and anxiety in emerging adults in the United States. *Depress Anxiety* 2020;37:1280-1288.
14. Gallagher MW, Zvolensky MJ, Long LJ, Rogers AH, Garey L. The impact of Covid-19 experiences and associated stress on anxiety, depression, and functional impairment in American adults. *Cognit Ther Res* 2020;29:1-9.
15. Li J, Li X, Jiang J, Xu X, Wu J, Xu Y, et al. The effect of cognitive behavioral therapy on depression, anxiety, and stress in patients with COVID-19: a randomized controlled trial. *Front Psychiatry* 2020;11:580827.
16. Aldao A, Nolen-Hoeksema S, Schweizer S. Emotion-regulation strategies across psychopathology: a meta-analytic review. *Clin Psychol Rev* 2010;30:217-237.
17. Nolen-Hoeksema S, Morrow J. A prospective study of depression and posttraumatic stress symptoms after a natural disaster: the 1989 Loma Prieta Earthquake. *J Pers Soc Psychol* 1991;61:115-121.
18. Ehlers A, Mayou RA, Bryant B. Psychological predictors of chronic post-traumatic stress disorder after motor vehicle accidents. *J Abnorm Psychol* 1998;107:508-519.
19. García FE, Cova F, Rincón P, Vázquez C. Trauma or growth after a natural disaster? The mediating role of rumination processes. *Eur J Psychotraumatol* 2015;6:26557.
20. Hoffart A, Johnson SU, Ebrahimi OV. Loneliness and social distancing during the COVID-19 pandemic: risk factors and associations with psychopathology. Available at: [psyarxiv.com/j9e4q](https://psyarxiv.com/j9e4q). Accessed November 1, 2020.
21. Ye B, Wu D, Im H, Liu M, Wang X, Yang Q. Stressors of COVID-19 and stress consequences: the mediating role of rumination and the moderating role of psychological support. *Child Youth Serv Rev* 2020;118: 105466.
22. Treynor W, Gonzalez R, Nolen-Hoeksema S. Rumination reconsidered: a psychometric analysis. *Cogn Ther Res* 2003;27:247-259.
23. Cann A, Calhoun LG, Tedeschi RG, Triplett KN, Vishnevsky T, Lindstrom CM. Assessing posttraumatic cognitive processes: the event related rumination inventory. *Anxiety Stress Coping* 2011;24:137-156.
24. Calhoun LG, Cann A, Tedeschi RG. The Posttraumatic Growth Model: Sociocultural Considerations. In: Weiss T, Berger R, Editors. *Posttraumatic Growth and Culturally Competent Practice*. Hoboken, NJ: John Wiley, 2010, p.1-4.
25. Haber MG, Cohen, JL, Lucas T, Baltes BB. The relationship between self-reported received and perceived social support: a meta-analytic review. *Am J Community Psychol* 2007;39:133-144.
26. Turner RJ, Brown RL. Social Support and Mental Health. In: Scheid TL, Brown TN, Editors. *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems 2nd Edition*, New York: Cambridge University Press, 2010, p.200-212.
27. Saltzman LY, Pat-Horenczyk R, Lombe M, Weltman A, Ziv Y, McNamara T, et al. Post-combat adaptation: improving social support and reaching constructive growth. *Anxiety Stress Coping* 2018;31:418-430.
28. Saltzman LY, Hansel TC, Bordnick, PS. Loneliness, isolation, and social support factors in post-COVID-19 mental health. *Psychol Trauma US* 2020;12:S55-S57.
29. Puterman E, DeLongis A, Pomaki G. Protecting us from ourselves: social support as a buffer of trait and state rumination. *J Soc Clin Psychol* 2010;29:797-820.
30. Yang X, Yang X, Kumar P, Cao B, Ma X, Li T. Social support and clinical improvement in COVID-19 positive patients in China. *Nurs Outlook* 2020;68:830-837.
31. Lechner WV, Laurene KR, Patel S, Anderson M, Grega C, Kenne DR.

- Changes in alcohol use as a function of psychological distress and social support following COVID-19 related University closings. *Addict Behav* 2020;110:106527.
32. Labrague LJ, De los Santos JAA. COVID-19 anxiety among front line nurses: predictive role of organisational support, personal resilience and social support. *J Nurs Manage* 2020;28:1653-1661.
  33. Li X, Wu H, Meng F, Li L, Wang Y, Zhou M. Relations of COVID-19-related stressors and social support with Chinese college students' psychological response during the COVID-19 pandemic. *Front Psychiatry* 2020; 11:1084.
  34. Derogatis LR. *The Brief Symptom Inventory-18 (BSI-18): Administration, Scoring and Procedures Manual*. Minneapolis, MN: National Computer Systems; 2001.
  35. Park KP, Woo SW, Chang MS. Validation study of brief symptoms inventory-18 (BSI-18) in college students. *Korean J Clin Psychol* 2012;31: 507-521.
  36. Ahn HN, Joo HS, Min JW, Sim KS. Validation of the event related rumination inventory in a Korean population. *Cogn Behav Ther Kor* 2013;13: 149-172.
  37. Park J. *A Study to Develop a Scale of Social Support*. Seoul: South Korea: A doctoral dissertation submitted to Yonsei University; 1985.
  38. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiatry* 2020; 7:547-560.
  39. Lyubomirsky S, Nolen-Hoeksema S. Self-perpetuating properties of dysphoric rumination. *J Pers Soc Psychol* 1993;65:339-349.
  40. Grey I, Arora T, Thomas J, Saneh A, Tohme P, Abi-Habib R. The role of perceived social support on depression and sleep during the COVID-19 pandemic. *Psychiatry Res* 2020;293:113452.
  41. Xiao H, Zhang Y, Kong D, Li S, Yang N. The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monit* 2020;26:e923549.
  42. Leigh-Hunt N, Bagguley D, Bash K, Turner V, Turnbull S, Valtorta N, et al. An overview of systematic reviews on the public health consequences of social isolation and loneliness. *Public Health* 2017;152: 157-171.
  43. Shin Y, Lee J. South Korea's proactive approach to the COVID-19 global crisis. *Psychol Trauma US* 2020;12:475-477.
  44. Taku K, Cann A, Tedeschi RG, Calhoun LG. Intrusive versus deliberate rumination in posttraumatic growth across US and Japanese samples. *Anxiety Stress Coping* 2009;22:129-136.
  45. Park CL. Making sense of the meaning literature: an integrative review of meaning making and its effects on adjustment to stressful life events. *Psychol Bull* 2010;136:257-301.
  46. Tedeschi RG, Calhoun LG. Posttraumatic growth: conceptual foundations and empirical evidence. *Psychol Inq* 2004;15:1-18.