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Differential roles of reflection and brooding on the relationship between perceived stress and life satisfaction during the COVID-19 pandemic: A serial mediation study

Bin-Na Kim\textsuperscript{a}, Hyo Shin Kang\textsuperscript{b,*}

\textsuperscript{a} Department of Psychology, Gachon University, Seongnam, South Korea
\textsuperscript{b} Department of Psychology, Kyungpook National University, Daegu, South Korea

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ABSTRACT

Perceived stress is associated with low life satisfaction; however, the underlying mechanism is relatively underexplored. This study investigated whether rumination might mediate this link during the highly stressful COVID-19 pandemic. Building on the distinction between the subtypes of rumination, we predicted that reflection and brooding would sequentially mediate this relationship and that maladaptive brooding would negatively influence life satisfaction. A representative sample of 316 adults was recruited from the greater Daegu area, where the first massive outbreak occurred in South Korea. After informed consent was obtained, they completed a package of questionnaires that included demographics, COVID-19-related experiences, perceived stress, life satisfaction, and rumination. A serial mediation analysis showed that reflection and brooding sequentially mediated the relationship between perceived stress and life satisfaction. As predicted, only brooding was negatively related to life satisfaction. In contrast, reflection per se was positively related to life satisfaction, and it negatively affected life satisfaction only through brooding. Our results extended the negative effect of brooding, as compared to reflection, in the pandemic. Given that reflection may easily turn into brooding under stress, it will be necessary to develop ways to guide people to counteract brooding while maintaining a reflective self-focus to preserve their well-being.

1. Introduction

For over a year, the world has managed to cope with the Coronavirus Disease 2019 (COVID-19). Beyond its direct impact on physical health as an infectious disease, COVID-19 has drastically altered both the public and private aspects of daily life. Despite the commencement of vaccination drives in early 2021, the COVID-19 crisis is still evolving. As minimizing unnecessary interpersonal contact became a priority to prevent the spread of the virus, remote working and online education rapidly became the new normal. People have been mandated to refrain from having social gatherings in most countries due to the need for social distancing. Many people have undergone screening tests and self-quarantine. In places where these efforts were not effective enough to curb the spread of COVID-19, the authorities decided to execute more radical measures such as placing cities and towns under lockdown, which resulted in substantial economic damage. It is well-known that the COVID-19 outbreak and the extreme measures undertaken to contain it have contributed to increased mental health problems in the general population, ranging from anxiety and depression to post-traumatic stress disorder (e.g., Wang et al., 2020; Xiong et al., 2020).

1.1. Perceived stress and life satisfaction

Evidently, all these changes during the pandemic can act as significant stressors that induce a considerable level of stress. When one perceives that the demands of these stressors exceed their coping capacity, it may elicit heightened negative affect and physiological arousal, thereby increasing the risk of causing a variety of physical and mental disorders (Lazarus & Folkman, 1984). Given the centrality of appraisal, perceived stress is more significant than the objective occurrence of stressful events. Perceived stress is defined as the overall evaluation of difficulty in dealing with personal and environmental challenges (Zheng et al., 2019, p. 3091). Numerous studies have indicated that perceived stress is strongly associated with negative emotions, which are in turn...
related to lower life satisfaction (Cohen et al., 1983; Hamarat et al., 2001; Schiffrin & Nelson, 2010; Spada et al., 2008). However, the relationship between perceived stress and life satisfaction has been relatively underexamined (Zheng et al., 2019).

1.2. Differential role of rumination: brooding versus reflection

A potential mediating factor that can underlie the link between perceived stress and life satisfaction is rumination. Since Nolen-Hoeksema and colleagues introduced rumination as an individual's tendency to repetitively and passively focus on negative internal states (e.g., dysphoria) (Nolen-Hoeksema & Morrow, 1991), rumination has been extensively examined as a transdiagnostic vulnerability that can impact a plethora of mental health problems, which include anxiety, depression, psychosis, insomnia, and impulsive behaviors (Watts & Roberts, 2020). Furthermore, trait rumination is known to exacerbate and maintain physiological stress responses, as indexed by exaggerated cardiovascular activity or increased cortisol (Busch et al., 2017; Zoccola & Dickerson, 2012).

In examining the mediating role of rumination, it is necessary to divide rumination into functionally different subtypes (Trapnell & Campbell, 1999). For example, Treynor et al. (2003) reanalyzed the items of the Ruminative Responses Scale (RRS) and found two subtypes, brooding and reflection, after eliminating problematic items that displayed an overlap with depressive symptoms. Brooding items were negatively-valenced, defined by passively comparing the current situation with unaccomplished standards. In contrast, reflection items were neutral in valence, characterized by intentionally focusing on internal states as a type of cognitive problem-solving. Although the two subtypes of rumination are positively correlated, numerous studies have consistently illustrated that brooding strongly predicts pathological outcomes (Bastin et al., 2015; Cole et al., 2015; Newman & Nezlek, 2019).

Meanwhile, the effect of reflection was less negative than that of brooding. Some argued that reflection is an adaptive emotion-regulation strategy that is conducive to emotional processing over time, whereas others found the role of reflection to be less negative or neutral (Adrian et al., 2014; Newman & Nezlek, 2019; Treynor et al., 2003).

Therefore, previous investigations that did not distinguish the subtypes of rumination when examining its mediating role were limited in the above regards (Satici et al., 2020; Zheng et al., 2019). Before COVID-19, Zheng et al. (2019) showed that self-control and rumination sequentially mediated the relationship between perceived stress and life satisfaction in Chinese adolescents. Satici et al. (2020) examined a sample of Turkish adults during the COVID-19 pandemic. They demonstrated that rumination and the fear of COVID-19 serially mediated the relationship between intolerance of uncertainty and mental well-being. In both studies, rumination functioned as a significant mediator that had a negative impact on life satisfaction and well-being. However, the differential roles of reflection and brooding have not been specifically examined.

Which of the two precedes the other in the mediating chain? The fact that both subtypes of rumination are positively correlated suggests that those who engage in either of the two are likely to also engage in the other. Based on their correlation and previous research, we did not posit these two subtypes of rumination to be parallel, but instead assumed a serial mediation. An alternative definition of rumination can be traced back to early studies by Martin and Tesser (1996, 2006), who proposed that rumination operates in accordance with a function of goal progress. When goal pursuit is obstructed, rumination is initiated in an attempt to enhance the accessibility of the unaccomplished goal and goal-related information. In a similar vein, Wells and Matthews (1994) argued that rumination is a kind of adaptive self-control to find alternative ways to achieve a goal, although it may become maladaptive and uncontrollable if its instrumental quality is lost. As Matthews and Wells (2000) put it, rumination is an emotion-focused coping masquerading as problem-focused coping. Although few studies have examined the two subtypes of rumination in a one-causing-the-other manner, Takano and Tanno (2009) provided empirical support for the above speculation. In a semi-longitudinal study that employed two-time point assessments with a 3-week interval, they demonstrated that reflection predicted brooding, but not vice versa.

In sum, early theorists conceptualized rumination as a wider term. They viewed it as repetitive thoughts about unfulfilled goals and problems, that is, something that could be adaptive or maladaptive in itself. In contrast, Nolen-Hoeksema and colleagues provided a narrow definition of rumination that focused mostly on its negative consequences, suggesting that even self-reflection, which was intended to facilitate problem-solving at first, could easily lead an individual to getting trapped in a vicious cycle of negative mood-thought (Lyubomirsky & Nolen-Hoeksema, 1993). Therefore, it is possible that reflection can be regarded as an initial form of rumination, which may later transform into a more pathological form of rumination, brooding.

1.3. The present study

Drawing on the distinction between the two types of rumination, we examined whether reflection and brooding serially mediated the relationship between perceived stress and life satisfaction in individuals undergoing the global crisis created by the pandemic. Based on existing literature pointing to brooding as a maladaptive subtype of rumination, we predicted that only brooding would be negatively related to life satisfaction. We predicted that reflection would negatively influence life satisfaction only through brooding.

2. Materials and methods

2.1. Participants

In total, 316 adults aged 20 years or older participated in this study. A representative sample was recruited in early August 2020 from the greater Daegu area, where the first massive COVID-19 outbreak in South Korea occurred from February 2020. We recruited a representative sample of community-dwelling adults in terms of age and gender to increase generalizability. After the participants’ informed consent was obtained, they completed a package of self-report questionnaires designed for a large-scale survey that included a variety of measures relevant to psychological adaptation during the pandemic. A detailed sample description can be found elsewhere (Kang & Kim, 2021). The average age was 43.28 years (SD = 12.61), and about half (49.4%) of the participants were male. One (3%) of the participants was previously diagnosed with COVID-19 and 31 (9.8%) had family members or close friends who had been diagnosed with the disease. In addition, one-fifth of the participants had experienced screening tests or self-quarantine, which indicates that the infection was widespread within the community. The Institutional Review Board of Kyungpook National University approved all the materials and procedures used in this study (KNU-2020-0054).

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1 This was designed as a large-scale survey intended to explore individual differences responsible for psychological adaptation during the COVID-19 pandemic. Data pertaining to event-related rumination (intrusive versus deliberate rumination), psychological distress, and social support were published as a separate study (Kang & Kim, 2021). The dataset used for the present study (reflection, brooding, perceived stress, and life satisfaction) were not used for other studies, although there were obtained from the same participants. Currently, we are planning to collect longitudinal data of this cohort to investigate adaptational change over time as the pandemic crisis evolves.
2.2. Measures

2.2.1. Demographics and COVID-19-related variables

With regard to demographic variables, participants were asked to report their age, gender, education level, and marital status. Questions regarding COVID-19-related experiences were also included. In addition to checking whether they had experienced a COVID-19 diagnosis (themselves, family members, or close friends), screening tests, or self-quarantine, we included two 5-point Likert items to query the subjective severity of COVID-19-related experiences (disruption in daily life M = 3.84, SD = 0.78, perceived traumatic experience M = 2.94, SD = 0.10), which were adapted from the study by García et al. (2015).

2.2.2. Korean version of the Perceived Stress Scale (K-PSS)

The PSS is a self-report questionnaire that assesses the degree of individual perceived stress in daily life (Cohen et al., 1983). The K-PSS was administered in this study (Lee et al., 2012). It consists of 10 items rated on a 5-point Likert scale (from 0 = never to 5 = very often). A higher score indicated greater perceived stress. The internal consistency in the present study was appropriate (Cronbach’s α = 0.78).

2.2.3. Korean version of the Ruminative Response Scale (K-RRS)

The RRS was developed to assess responses to depressed mood that are focused on the self, depressive symptoms, and the possible causes and consequences of the sad/depressed mood (Nolen-Hoeksema & Morrow, 1991). The RRS contains three subscales: depression, brooding, and reflection (Treynor et al., 2003). The K-RRS was used in this study (Kim et al., 2010). Participants were asked to respond to five items that measured brooding and another five items that measured reflection. The items were rated on a 4-point Likert scale (from 1 = not at all to 4 = very much), with higher scores indicating a higher level of ruminative response style. The internal consistencies of both subscales were good (Cronbach’s α: rumination = 0.85, reflection = 0.83).

2.2.4. Korean version of the Satisfaction with Life Scale (K-SWLS)

The SWLS is a self-report questionnaire that assesses how satisfied an individual is with their life as a whole (Diener et al., 1985). The K-SWLS was used in this study (Cho & Cha, 1998). The scale consists of five items on a 7-point Likert scale (from 1 = not at all to 7 = very much). Higher scores indicate higher levels of satisfaction. The internal consistency in the present study was excellent (Cronbach’s α = 0.92).

2.3. Statistical analysis

We first conducted correlational analyses to examine how the main variables—perceived stress, rumination (brooding and reflection), and life satisfaction—were associated with each other. Next, a serial mediation analysis was conducted using Model 6 of the PROCESS macro for SPSS (Hayes, 2013). We assessed the indirect effect of perceived stress on life satisfaction through brooding, reflection, and the serial mediation of the two. The bias-corrected bootstrap method with 1000 resamples was used to calculate 95% confidence intervals (CIs). Statistical analyses were performed using the SPSS ver. 24.0 (Armonk, NY: IBM Corp.).

3. Results

3.1. Preliminary analysis

The descriptive statistics and correlations between the main variables are presented in Table 1. First, perceived stress was negatively related to life satisfaction (r = −0.37, p < .001). However, it was positively correlated with both subtypes of rumination, although the brooding’s magnitude of correlation (r = 0.58, p < .001) was much greater (Z = 6.44, p < .001; Lenhard & Lenhard, 2014). Despite the strong positive correlation between reflection and brooding (r = 0.60, p < .001), only brooding (r = −0.25, p < .001) was negatively associated with life satisfaction in pairwise correlations.

3.2. Mediation analysis

Serial mediation analysis was performed in which reflection preceded brooding. As Fig. 1 and Table 2 show, a total of three indirect paths were significant. Both reflection and brooding partially mediated the relationship between perceived stress and life satisfaction respectively. However, the directions of relation in the paths between the mediator and outcome variables were the opposite. While reflection was positively related to life satisfaction (b = 0.44, SE = 0.13, p < .01), brooding was negatively related to life satisfaction (b = −0.42, SE = 0.15, p < .01). Finally, a serial mediation was significant in that perceived stress led to increased reflection, which in turn was related to heightened brooding and ultimately to decreased life satisfaction (indirect effect = −0.04, Boot SE = 0.02, 95% CI [−0.09 to −0.01]). Thus, our hypothesis that reflection and brooding would serially mediate the relationship between perceived stress and life satisfaction was supported.

4. Discussion

As predicted, this cross-sectional study found support that reflection and brooding serially mediate the relationship between perceived stress and life satisfaction. Additionally, only brooding was negatively associated with life satisfaction. Reflection negatively influenced life satisfaction only through brooding, and reflection itself was positively associated with life satisfaction. This is consistent with previous research, which demonstrated that brooding is the more maladaptive type of self-focus responsible for negative outcomes (Cole et al., 2015; Newman & Nezlek, 2019; Treynor et al., 2003). Our study extends the existing literature by demonstrating the negative effect of brooding in a community-dwelling adult sample, who underwent the first massive COVID-19 outbreak in South Korea. Moreover, we took a step forward...
are leading to tremendous stress reactions, such as frustration, helplessness, and disregard for social distancing (Taylor et al., 2020). In this prolonged stressful situation that the world is in—the conclusion of which seems distant—this study highlights the fact that we could adapt to the current situation better by reorienting our pattern of thought to inculcate reflection instead of brooding. However, given that reflection may easily deteriorate into brooding, it is essential to develop an effective psychological intervention technique to guide people to counteract brooding while maintaining a reflective self-focus to preserve their well-being.

In conclusion, the present study provides initial empirical evidence that reflection and brooding sequentially mediate the relationship between perceived stress and life satisfaction. This study contributes to a deeper understanding of the underlying mechanism of stress and life satisfaction during the pandemic. Our results suggest that brooding aggravates and reflection may mitigate the negative impact of perceived stress on life satisfaction. In this prolonged stressful situation that the world is in—the conclusion of which seems distant—this study highlights the fact that we could adapt to the current situation better by reorienting our pattern of thought to inculcate reflection instead of brooding. However, given that reflection may easily deteriorate into brooding, it is essential to develop an effective psychological intervention technique to guide people to counteract brooding while maintaining a reflective self-focus to preserve their well-being.

CRediT authorship contribution statement

Author Bin-Na Kim designed the study, collected and analyzed data, and wrote the first draft (Introduction and Results). Author Hyo Shin Kang designed the study, collected and analyzed data with the first author (B-N. K.), and wrote the first draft (Methods and Discussion). All authors have approved the final manuscript.

Declaration of competing interest

None.
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