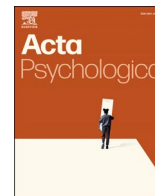




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Stress, and coping strategy of university students during COVID-19 in Korea: The mediating role of ego-resiliency

Young Hee Park, In Hong Kim, Yeo Won Jeong*

Department of Nursing, College of Nursing, Dongguk University, 123 Dongdae-ro, Gyeongju-si, Gyeongsangbuk-do, 38066, Republic of Korea

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ABSTRACT

We aimed to identify the level of stress, ego-resiliency (ER), and coping strategies of university students during the onset of coronavirus disease 2019 (COVID-19) and examine the mediating role of ER in the relationship between stress and coping strategies (e.g., problem-solving, social support seeking, and avoidance). We analyzed responses from 160 university students and found that problem-solving was the most common coping strategy (26.02 ± 4.65), followed by social support-seeking (25.08 ± 5.23), and avoidance (19.21 ± 3.78). ER was negatively associated with stress and showed a mediating effect on the relationship between stress and social support, and stress and problem-solving coping strategies. These findings indicate that ER helps decrease stress caused by the pandemic among university students and should be considered a significant factor for developing adaptive stress coping strategies.

1. Introduction

Since February 2021, the coronavirus disease 2019 (COVID-19) has infected more than 114 million people worldwide (Dong, Du, & Gardner, 2020). It has also affected global mental health, as evidenced by panic-buying worldwide as case numbers soared (Wang et al., 2020). Although few cases had been reported in South Korea until February 19, 2020, an explosive increase in the number of confirmed cases led to the first wave of COVID-19 from May onwards (British Broadcasting Corporation, 2020; Korea Disease Control and Prevention Agency, 2020). While the nationwide control of COVID-19 is undoubtedly a success, people's pandemic-related psychological well-being during this period has not been enough evaluated (Lee, Dean, Baxter, Griffith, & Park, 2021).

COVID-19 related stress is mitigated by one's ego-resiliency (ER). Individuals with higher ER exhibit lower levels of stress due to the pandemic (Kubo, Sugawara, & Masuyama, 2020). ER refers to an individual's coping resource and capacity that manifests in an environmental context, including his/her physical, psychological, and social well-being (Block & Kremen, 1996; Jeong & Kim, 2015). It is the capacity and psychological resource of an individual to flexibly adapt to stressful conditions, such as the COVID-19 pandemic, and is established through an interaction of coping strategies in such situations (Block & Block, 1980; Klohnen, 1996; Kubo et al., 2020). According to Lazarus

and Folkman (1984), coping refers to an individual's continually changing cognitive and behavioral efforts to manage external and internal stimuli. Based on this conceptualization and other existing coping-related concepts and measures, Amirkhan (1990) proposed three distinct coping strategies—two of which are positive (i.e., problem-solving and seeking social support) and one that is negative (i.e., avoidance). Specifically, a problem-solving strategy reflects more of a direct manipulation of the stressor, rather than the mere awareness of it. Social support seeking reflects the basic need for emotional or instrumental human contact when faced with stressors. Avoidance reflects the withdrawal of emotion-focused responses when faced with stressors (Amirkhan, 1990; Shin & Kim, 2002).

A major concern during the pandemic has been elevated stress and increased mental health problems among those affected, particularly the subset of people with a high risk for mental health problems, such as university students (Debowska, Horeczy, Boduszek, & Dolinski, 2020; Wang et al., 2020). Attending university is a period of emerging adulthood characterized by drastic psychosocial changes, mental-health-related concerns, and difficulties due to academics, interpersonal relationships, and the need to adapt to college life (Azmitia, Syed, & Radmacher, 2013). Since the onset of the pandemic, increased levels of psychological distress, including stress among college students in the US, China, and France, have been reported (Bourion-Bédès et al., 2021; Cao et al., 2020; Liu et al., 2020; Wang, Hegde, et al., 2020; Ye et al.,

* Corresponding author.

E-mail addresses: gml34@dongguk.ac.kr (Y.H. Park), ihk2624@dongguk.ac.kr (I.H. Kim), ywjeong@dongguk.ac.kr (Y.W. Jeong).

2020). Because both social and interpersonal environments will likely change during this period, ER can be crucial for a successful transition from adolescence to adulthood (Milioni, Alessandri, Eisenberg, & Caprara, 2016).

Most studies on the relationship between COVID-19 and mental health generally focus on resilience (Labrague & De los Santos, 2020; Petzold et al., 2020; Tam et al., 2021; J. Zhang et al., 2020), paying relatively less attention to ER. Resilience is the capacity to overcome adversity, and is based on a “dynamic developmental process” resulting from exposure to substantial adversity. However, ER refers to an individual's dynamic capacity to modify their level of control in response to situational demands and circumstances based on their personality traits or resources, and is distinct from resilience (Farkas & Orosz, 2015; Block & Kremen, 1996; Jeong & Kim, 2015; Klohnen, 1996; Letzring, Block, & Funder, 2005). One previous study showed the mediating role of ER in the process of selecting coping strategies depending on the requirements of a specific difficult situation (Ziarko, Mojs, Sikorska, & Samborski, 2020). ER is a meta-resource that can be used to control and facilitate the flexible selection of coping strategies in response to a difficult situation (Letzring et al., 2005; Ziarko et al., 2020). As a result of adaptive flexibility, highly ego-resilient individuals are likely to exhibit better psychological adjustment than individuals with a low level of ER according to the situational context (Block & Kremen, 1996; Klohnen, 1996; Letzring et al., 2005).

ER and coping strategies may differ depending on the stress event (Letzring et al., 2005). Although young adults highly utilized avoidance during the pandemic (Young et al., 2021), their coping strategies may change depending on the sociocultural context (Stephenson & DeLongis, 2020). The role of ER in the relationship between stress and coping strategies within the context of South Korea may differ from that in other countries. Thus, this study aimed to investigate the coping strategies employed by South Korean college students to handle stress during the pandemic, and examine the role of ER in this relationship.

The proposed hypotheses are as follows:

Hypothesis 1. (H1): ER mediates the relationship between stress and positive coping strategies (i.e., problem-solving and social support-seeking).

Hypothesis 2. (H2): ER mediates the relationship between stress and avoidance coping strategies.

2. Methods

2.1. Study design and participants

A cross-sectional design was used to identify the mediating effect of ER in the relationship between stress and coping strategies in university students. The following make up the selection criteria for the student participants: (1) at least 19 years old and was enrolled in a Korean university or was taking leave of absence during the study period, and (2) understood the study's aim and voluntarily agreed to participate. Our sample included 160 Korean university students (43 men, 26.9%; 117 women, 73.1%) whose mean age was 21.51 ± 2.65 years (min 19, max 38).

2.2. Measures

2.2.1. Stress and stressful events

Stress was measured using the Global Assessment of Recent Stress (GARS) developed by Linn (1986), which was modified and adapted into Korean by Koh and Park (2000). The scale comprises eight items regarding the level of stress in the past week, and each item is rated on a 10-point Likert scale (0 = None at all to 10 = Extreme). The total sum ranges from 0 to 72 (higher scores indicated higher stress). Cronbach's alpha was 0.69–0.92 in Linn's (1986) study, 0.86 in Koh and Park's (2000) study, and 0.81 in the present study. Moreover, the students were

asked about the stressful events they experienced during the pandemic through the question: “Write about the five most stressful events that you have experienced in the last 6 months.”

2.2.2. Ego-resiliency

To measure ER as a set of personality traits, the ER scale (ER89) developed by Block and Kremen (1996) was used. This scale contains 14 items, with each item rated on a 4-point scale ranging from 1 (Does not apply at all) to 4 (Applies very strongly). The total scoring ranges from 14 to 56; higher scores indicate a higher ER. Here, we used the Korean version of the ER89 (Jeong & Oh, 2020). Cronbach's alpha was 0.82 in Jeong and Oh's (2020) study and 0.80 in this study.

2.2.3. Coping strategy

Coping strategies were measured using the Korean version of the coping strategy indicator developed by Amirkhan (1990) and translated and validated by Shin and Kim (2002). This scale comprises 33 items within three subcategories (11 items each for problem-solving, social support-seeking, and avoidance coping strategies). Each item is rated on a 3-point Likert scale (1 = “None,” 2 = “A little,” 3 = “A lot”) for how often they have employed the different types of coping strategies when they experienced difficulties. The total score of each coping strategy ranges between 11 and 33; a higher score for each category indicated greater use of that coping strategy. In Amirkhan's (1990) study, the Cronbach's alpha for problem-solving, social support-seeking, and avoidance coping strategies were 0.89, 0.93, and 0.84, respectively. In Shin and Kim's (2002) study, it was 0.88, 0.90, and 0.67, respectively. In this study, it is .90, 0.88, and 0.64, respectively.

2.3. Procedures and ethical consideration

After obtaining approval from XXX University's Institutional Review Board (XXX IRB 2020017), the study was conducted through a self-reported online survey of first- to fourth-year university students between May 2020 and June 2020. An online advertisement for research recruitment was posted on the universities' learning management system. The online advertisement included information on the research background, purpose, procedure, and provided hyperlinks to the survey questionnaires. In addition, information on voluntary participation and withdrawal from the research, as well as confidentiality were also provided. After reading the information about the research, participants had to provide their informed consent before they can view the questionnaire. The survey took approximately 15 min to accomplish. A total of 190 participants were recruited, of which 30 were excluded due to incomplete responses.

2.4. Covariates

The covariates were age, sex, grade, area of residence, media used to obtain COVID-19 information, experience of being diagnosed with COVID-19 or coming into contact with an infected person, and experience of visiting screening clinics for COVID-19. Areas of residence were divided into Seoul and Gyeonggi, Gyeongsangbuk-do and Daegu, and other areas with a high number of COVID-19 cases.

2.5. Data analysis

Data were analyzed using SPSS 25.0 (IBM Corp., Armonk, NY, USA) and SPSS PROCESS macro v3.4. The participant characteristics and main variables were analyzed using descriptive statistics. All main variables satisfied the assumption of normality (skewness: -0.435 – 0.326 , kurtosis: -0.545 ~ -0.018) (West, Finch, & Curran, 1995). Correlations among the main variables were analyzed using Pearson's correlation coefficient. To evaluate the association between stress, ER, and stress coping strategies, as well as the mediation effect of ER, PROCESS macro for SPSS (Model 4) was used (Hayes, 2017). Significance was evaluated

by bootstrapping Hayes' PROCESS macro. A significant indirect effect was identified when the confidence interval (CI) did not include zero. Statistical significance was set to $p < .05$.

3. Results

3.1. Descriptive statistics

This study was conducted immediately after the second wave of COVID-19 occurred in South Korea. Most of the participants (40.6%) were residents of areas affected by the second wave (Seoul, Incheon, and Gyeonggi province). Some residents (35.0%) were from areas affected by the first wave (Daegu and Gyeongbuk province) and the remaining participants (24.4%) lived in other regions. Only 3.1% had been diagnosed with COVID-19 or had contact with a COVID-19 patient, and 7.5% had received COVID-19 screening. Approximately 66.9% of the participants obtained COVID-19 information through online channels (e.g., TV, KDCA website, and Internet news articles), while 33.1% acquired information from fliers provided by public health centers. The most common coping strategy was problem-solving (53.8%), followed by social support-seeking (40.0%) and avoidance (6.2%). The mean results in the study population were the following: 23.71 ± 10.85 for stress, 38.24 ± 6.58 for ER, 26.02 ± 4.65 for problem-solving, 25.08 ± 5.23 for social support-seeking, and 19.21 ± 3.78 for avoidant coping strategies (Table 1).

3.2. Stressful events experienced during COVID-19

Reduced social activities due to COVID-19 that led to problems with friends or families was the most stressful event experienced by university students (e.g., closure of public facilities, difficulty engaging in hobbies, cancellation of travel plans, and inability to meet friends or attend classes). Some students mentioned problems related to employment (e.g., employment schedule cancellation or postponement, decrease in the number of employees, and changes in external exams including certifications or TOEIC exams). Some students also mentioned feeling anxious about the future. They were worried about getting

Table 1
General characteristics and differences by coping strategy.

Variables	Total n (%) or M ± SD	Range
Age (year)	21.51 ± 2.65	18–38
Sex		
Male	43 (26.9)	–
Female	117 (73.1)	–
Grade		
First-year	39 (24.4)	–
Second-year	23 (14.4)	–
Third-year	23 (14.4)	–
Fourth-year	75 (46.9)	–
Residence		
Daegu and Gyeongbuk	56 (35.0)	–
Seoul, Incheon, and Gyeonggi	65 (40.6)	–
Others	39 (24.4)	–
Information on COVID-19		
By TV	57 (35.6)	–
By homepage of public organization (e.g., KCDC)	27 (16.9)	–
By internet news	23 (14.4)	–
By leaflet published by health centers	5 (3.1)	–
Others	1 (0.6)	–
Experience of COVID-19 infection or contact with a COVID-19 patient	5 (3.1)	–
Experience of visiting screening clinics for COVID-19	12 (7.5)	–
Stress	23.71 ± 10.85	1–49
Ego-resiliency	38.24 ± 6.58	22–56
Coping strategies		
Problem-solving	26.02 ± 4.65	13–33
Social support-seeking	25.08 ± 5.23	11–33
Avoidance	19.21 ± 3.78	11–30

infected with COVID-19 and felt discomfort from constantly having to wear a mask. Additionally, 14 students directly described experiencing negative psychological problems (e.g., depressive symptoms and loneliness) during the pandemic (Table 2).

3.3. Correlation among main variables

The problem-solving coping strategy was negatively correlated with stress ($r = -0.191, p = .015$) and positively correlated with ER ($r = 0.246, p = .002$). The social support-seeking coping strategy was positively correlated with ER ($r = 0.219, p = .005$) and the problem-solving strategy ($r = 0.396, p < .001$). The avoidant coping strategy was positively correlated with stress ($r = 0.207, p = .009$), and negatively correlated with the problem-solving strategy ($r = -0.227, p = .004$) (Table 3).

3.4. Mediating effect of ER between stress and coping strategies

ER mediated the relationship between stress and problem-solving, as well as that between stress and the social support-seeking coping strategy (Fig. 1). Stress negatively and significantly predicted ER ($B = -0.17, t = -3.58, p < .001$), and ER positively and significantly predicted the problem-solving ($B = 0.14, t = 2.44, p = .015$) and social support-seeking coping strategies ($B = 0.18, t = 2.90, p = .004$). Moreover, the index of mediation was significant; the indirect effect of stress on problem-solving through ER was significant ($B = -0.03, 95\% \text{ CI } -0.07, -0.01$), thus supporting H1. The indirect effect of stress on the social support-seeking coping strategy through ER was significant ($B = -0.03, 95\% \text{ CI } -0.07, -0.01$). Thus, H2 was supported (Table 4). The direct effect of stress on problem-solving and social support-seeking coping strategy under controlling ER was not significant ($B = -0.06, p = .077 / B = -0.00, p = .920$). The mediating effect of ER between stress and the avoidant coping strategy was insignificant ($B = 0.04, t = 0.94, p = .349$); therefore, H3 was not supported.

4. Discussion

This study aimed to examine the role of ER in the relationship between COVID-19 related stress levels and coping strategies among South Korean college students during the pandemic. The results showed that the students were subject to various stressors, such as the restriction of social activities, enforcement of social distancing measures, and closure of educational institutions. This is in line with the results of Moawad's (2020) study, which indicated that college students have an elevated level of stress due to uncertainties pertaining to their final exams and evaluations. Another stressor brought about by COVID-19 is the

Table 2
Stressful events experienced by university students during COVID-19.

Stressful events	n ^a
Limited social activities due to COVID-19	58
Term exam	56
Increased workload in major subjects due to COVID-19	55
Problems with friends and romantic partners	44
Employment difficulty	40
Stress related to COVID-19 infection	32
Clinical practice-related stress	21
Financial problems	21
Family problems	15
Insomnia and psychological problems (depressive symptoms, loneliness, frustration, helplessness, tiredness)	14
Anxiety about the future	13
Difficulties related to part-time job (layoffs or seeking employment)	10
Change in external exam schedule (cancellation or postponement)	8
Physical health problems	8
Others	3

^a Duplicate response.

Table 3
Correlation among main variables.

Variables	1	2	3	4	5
1. Stress	1				
2. Ego-resiliency	-0.300**	1			
3. Problem-solving coping strategies	-0.191*	0.246*	1		
4. Social support-seeking coping strategies	-0.021	0.219*	0.396**	1	
5. Avoidant coping strategies	0.207*	0.032	-0.227*	-0.054	1

* $p < .05$.
** $p < .001$.

instability of income (e.g., employment difficulties; financial problems; and challenges related to part-time jobs, such as getting laid off or difficulty getting hired). Financial repercussions were also identified as stressful events (Cao et al., 2020) by the participants.

ER mediated the relationship between stress and both positive coping strategies (problem-solving and social support-seeking), thus supporting our hypotheses. That is, high-ER students used problem-solving or sought social support to regulate their stress. This is in line with previous findings that people with high ER exhibit a low level of stress during the pandemic (Kubo et al., 2020) and their ER is positively correlated with social support and problem-solving coping (Skalski, Uram, Dobrakowski, & Kwiatkowska, 2020). We cannot directly compare our results with previous findings due to the lack of studies examining the mediating effects of ER during the pandemic. However, our results are similar to previous results suggesting that resilience has a partial mediating effect in the relationship between psychological distress and problem-focused coping in the general population (Lorente, Vera, & Peiró, 2021).

ER is a concept associated with ego-control (Block & Kremen, 1996; Block & Block, 1980; Jeong & Kim, 2015), and increasing the use of problem-solving coping strategies is expected to regulate stressful events and mitigate their adverse impact. Seeking social support is a particularly important coping strategy for college students in effectively coping with various stressors in their university lives (Cao et al., 2020; Zhang, 2017). ER appears to boost their ability to explore various forms of social support (e.g., social media) to cope with the situation, despite the limitations in face-to-face social activities (R. Zhang, 2017). Therefore, our first hypothesis was supported. In addition, the results of this study showed that ER enables psychologically vulnerable students to employ

adaptive coping strategies to regulate their stress and, thus, is an important psychological attribute during the pandemic. Hence, online programs boosting ER in university students should be developed to help them regulate stressors using positive coping strategies.

Avoidant coping strategies were found to be significantly positively associated with stress. This is consistent with previous findings that stress and avoidant coping strategies are both mental health risk factors that are significantly positively correlated in patients with eating disorders (Rodino, Gignac, & Sanders, 2018). Further, this is consistent with previous findings reporting that healthcare workers showed a high level of stress during the pandemic and employed avoidant coping strategies (Sharma et al., 2020). ER did not show a significant mediating effect between stress and avoidant coping strategies, which is in line with the results of previous studies (Fonseca, Cunha, Faria, Campos, & Queirós, 2021; Li, Eschenauer, & Persaud, 2018; Sinclair, Adams, & Dietrich, 2020; Ziarko et al., 2020). In a study of 502 emergency medical technicians, perceived stress had a mediating effect between resilience and dysfunctional coping strategies, but the direct effect of resilience on dysfunctional coping strategies was not observed (Fonseca et al., 2021). This suggests that more focus should be placed on controlling stress rather than ER for individuals who use dysfunctional or avoidant coping strategies when facing critical situations. In other studies, ER did not show a significant association with dysfunctional or avoidant coping strategies (Li et al., 2018; Ziarko et al., 2020). Moreover, avoidance, which is a post-traumatic stress disorder symptom, also did not show a significant association with ER (Sinclair et al., 2020). Previous researchers have considered ER as a protective factor that provides individuals with capacity of self-regulate their behavior and successfully adapt to stressful situations (Block & Kremen, 1996; Jeong & Kim, 2015; Letzring et al., 2005); while avoidant or dysfunctional coping strategies

Table 4
Indirect effect of stress on problem-solving and social support-seeking coping strategies.

Indirect effect(s) of stress on coping strategy - Y	Effect	BootSE	LLCI	ULCI	
Y: Problem-solving	Ego-resiliency	-0.02	0.01	-0.05	-0.00
Y: Social support-seeking	Ego-resiliency	-0.03	0.02	-0.06	-0.01
Y: Avoidance	Ego-resiliency	-0.01	0.01	-0.02	0.01

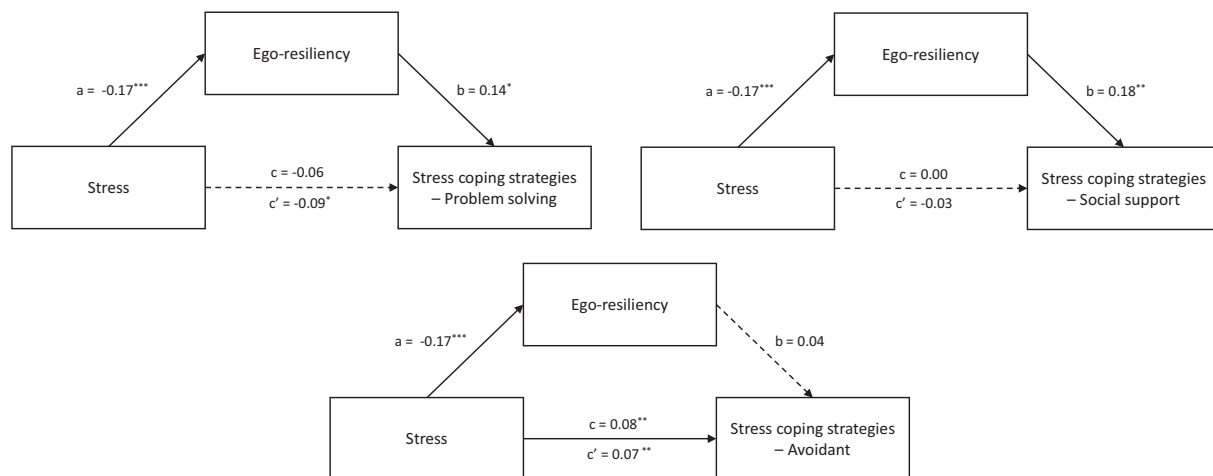


Fig. 1. Mediating effect of ER on the relationship between stress and problem-solving and social support-seeking coping strategies. The solid and dotted arrow line represent the significant and non-significant pathways, respectively; a and b coefficients mean indirect effect, the c coefficient means direct effect, and the c' coefficient means the total effect of stress on problem-solving, social support-seeking, and avoidant coping strategies. * $p < .05$, ** $p < .01$, *** $p < .001$.

can trigger maladjustment behavior (Li et al., 2018; Moritz et al., 2016). In addition, avoidance is an escapist response to stressful circumstances, while ER is developed in the process of successfully dealing with stressful events by viewing them more positively (Li et al., 2018). In other words, considering avoidant coping strategies as a maladjustment in stressful situations rather than flexible adaptation, ER could not be the role of buffer the effect of stress on avoidant coping strategies. This can be interpreted as ER only partially controlling the flexible selection of coping strategies (Ziarko et al., 2020), which is in line with a previous study that showed how ER has a partially significant effect in reducing depression and stress during COVID-19, but not anxiety and fear of COVID-19 (Kubo et al., 2020). However, the study did not clearly confirm the reasons behind this finding. Therefore, more research is needed to identify the mechanism between avoidant coping strategies and ER.

The limitations of this study are as follows. First, we could not consider the effect of sex on study parameters. Subsequent COVID-19 studies should focus on the effect of sex on psychological distress. Second, owing to the scarcity of research on psychological pain and coping strategies in South Korean college students during the pandemic, limitations exist in comparing and analyzing our findings. Future studies should continue to identify factors that can help psychologically vulnerable university students in successfully adjusting to college life during the pandemic. Third, the study population was not representative of the entire university student population affected by the pandemic. In addition, the data were derived from self-reported questionnaires administered through an online survey. While this method is useful during the COVID-19 pandemic, the means of collecting data can create recall bias, and risks associated with data distortion due to the tendency of participants to present themselves in a more positive light. Therefore, the results should be interpreted and generalized with caution.

The study is significant because it identifies the mediating effect of ER on the use of adaptive coping strategies during stressful situations amid the COVID-19 pandemic, particularly among psychologically vulnerable college students. ER showed a mediating effect between stress and problem-solving and stress and social support-seeking. Based on our results, it is necessary to develop programs for enhancing ER in university students in order to control stressors during stressful situations and enhance students' positive coping strategies. In addition, ER could not mediate the effect of stress on avoidant coping strategies. Therefore, more emphasis should be placed on stress management programs to help students learn to deal with their problems when they are under severe stress.

5. Conclusion

This study showed that the effect of ER is only limited to the mediation of the relationships between stress and the social support-seeking and problem-solving coping strategies, but not avoidance. In addition, the results suggest that ER should be considered a key factor in establishing constructive coping strategies. In addition, in the case of individuals using avoidant coping strategies, it is recommended to use proper stress management strategies in the face of stressors.

ER should be effectively utilized to compensate for the psychological vulnerability of students. Thus, educational interventions that focus on coping strategies and boost ER are necessary to prevent students from employing maladaptive strategies (e.g., avoidance). Students' mental well-being should be monitored during the pandemic to help them develop into well-adjusted adults. Schools and communities should also implement a mental health support system to address the psychological needs of this population.

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Ethnic consideration

The study obtained approval from Dongguk University's Institutional Review Board (DGU IRB 2020017).

CRedit authorship contribution statement

All authors contributed to the conception and design of the study. KIH collected data. JYW for data curation. JYW analyzed the data of the survey. JYW, KIH, and PYH wrote the manuscript. All authors have read and agreed to the published version of the manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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