ORIGINAL ARTICLE

Factors influencing posttraumatic growth among nurses caring for COVID-19 patients: A path analysis

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Abstract

Aims: Based on Calhoun and Tedeschi's posttraumatic growth model, this study aimed to establish a path model of posttraumatic growth among nurses who provided care for coronavirus disease 2019 (COVID-19) patients and to examine the associations between the relevant variables.

Background: There are increasingly many studies examining the psychological health status of nurses caring for patients on the front lines of COVID-19. However, research results showing the effects of various variables affecting nurses' posttraumatic growth through positive psychological transformation are insufficient.

Methods: This cross-sectional study was based on a sample of 229 nurses who cared for COVID-19 patients for more than 1 month in South Korea from April to May 2021.

Results: The fitness of the modified path model (χ^2 = 1.380, p = .502, GFI = 0.99, CFI = 1.00, NFI = 0.99, RMSEA = 0.00 and TLI = 1.01) was higher than that of the hypothesis path model (χ^2 = 124.133, p < .001, GFI = 0.85, CFI = 0.66, NFI = 0.65, RMSEA = 0.36 and TLI = 0.15). Deliberate rumination had directly influenced posttraumatic growth and posttraumatic stress disorder and social support had a direct and indirect effect on posttraumatic growth. Self-disclosure indirectly influenced posttraumatic growth through deliberate rumination but was not significant.

Conclusions: In order to improve posttraumatic growth of nurses caring for COVID-19 patients, it is necessary to provide and support opportunities for self-disclosure.

Implication for Nursing Management: The results of this study can help institutions and nurse managers comprehensively understand the factors affecting posttraumatic growth of nurses caring for COVID-19 patients in the front lines and determine basic strategies based on the importance of these factors.

KEYWORDS
COVID-19, nurses, path analysis, posttraumatic growth, posttraumatic stress disorder

1 | INTRODUCTION

On 30 January 2020, the World Health Organization declared a public health emergency of international concern (PHEIC) due to the exponential spread of coronavirus disease 2019 (COVID-19) (World Health Organization, 2020). As of 5 October 2021, the cumulative confirmed case number is 234,553,539, and cumulative fatalities have reached 4,796,222 globally, putting immense pressure on health care

systems (World Health Organization, 2021). Under these circumstances, the mental health of health care staff has been negatively affected by increased work burden, fear of infection, frustration, physical fatigue and inadequate personal protection equipment (Pfefferbaum & North, 2020), and health care personnel have been reported to experience posttraumatic stress disorder (PTSD) from the psychological pain (Lasalvia et al., 2021). Nurses who provided direct care to COVID-19 patients were found to have a higher risk of experiencing PTSD (Chen et al., 2021; Huang et al., 2020; Riello et al., 2020).

PTSD negatively affects nurses and causes symptoms such as hyper-alertness or hyper-arousal, re-experience or intrusion, sleep disorder and avoidance or emotional numbness (Mealer et al., 2007). The psychological effect of PTSD among nurses can decrease the quality of care provided to patients (Donnelly & Siebert, 2009). Ultimately, PTSD among nurses decreases job satisfaction and increases their intention to leave (Jung et al., 2020). However, nurses who provide care to patients in the front lines of COVID-19 have a strong will to treat patients (Hu et al., 2020; Jang et al., 2020). Nurses who participated in patient care during the COVID-19 pandemic have experienced posttraumatic growth by re-interpreting their lives after experiencing trauma and adjusting their self-perception, interpersonal relationships and attitude towards life in an improved direction (Chen et al., 2021; Cui et al., 2021). Nurses who experienced posttraumatic growth reported that growth helped them reflect on their experiences and find meaning, which ameliorated the negative effects of the traumatic experiences related to their work and improved life satisfaction (Cui et al., 2021). Moreover, the positive changes in perception caused by posttraumatic growth in nurses have been reported to result in self-improvement in areas including the ability to cope with difficulties in communication and patients' therapeutic circumstances (Yılmaz et al., 2018).

Although it has been a year since COVID-19 was declared a PHEIC, research about the mental health of nurses who participated in COVID-19 patient care is in its initial stages, with focus on negative changes such as fear and anxiety regarding exposure to COVID-19 (Jin & Lee, 2020), high depression, anxiety and insomnia (Kwon et al., 2020) and posttraumatic stress symptoms and intention to leave (Jung et al., 2020). Although studies related to posttraumatic growth are being conducted among nurses who participated in patient care in the front lines of COVID-19, research has not considered factors in a theoretically grounded manner. In order to consistently develop and promote posttraumatic growth among nurses, there is a need for a systematic approach in which factors are understood based on a theoretical framework. An exploration of factors suggested in the model of posttraumatic growth would be useful for understanding posttraumatic growth and its related factors comprehensively.

Therefore, this study aimed to establish a path model of posttraumatic growth among nurses who participated in COVID-19 patient care and to examine the relationships between the variables based on Calhoun and Tedeschi's model of posttraumatic growth. This study can provide foundational data for understanding posttraumatic growth among nurses who participated in COVID-19 patient care and

for preparing nursing strategies as part of a novel infectious disease response system.

1.1 | Conceptual framework

Calhoun and Tedeschi's model for posttraumatic growth (Tedeschi & Calhoun, 1996) was selected as the conceptual framework of this study. Posttraumatic growth, which occurs in individuals who have experienced trauma, battling a very negative situation that can cause severe psychological pain, refers to the positive changes that individuals experience (Tedeschi & Calhoun, 2004). Calhoun and Tedeschi's model for posttraumatic growth discusses people's responses when a traumatic event is recognized as a challenge that disrupts previously held aims and beliefs, management of emotional pain and life philosophy (Richard & Lawrence, 2004). Uncontrolled emotional pain after a traumatic event leads to intrusive ruminations (American Psychiatric Association & Association, 2013; Rider Mundey et al., 2019). Self-disclosure and deliberate rumination occur through social support, which leads to posttraumatic growth (Tedeschi & Calhoun, 2004). In this study, based on previous findings that nurses who provided care to patients in the front lines of a public health crisis are vulnerable to PTSD (Chen et al., 2005; Jung et al., 2020; Nowicki et al., 2020; Su et al., 2007), it is possible to hypothesize a path from PTSD to posttraumatic growth among nurses who participated in COVID-19 patient care (Figure 1).

2 | METHODS

2.1 | Design

This cross-sectional study was conducted to understand the paths from PTSD to posttraumatic growth.

2.2 | Participants and sample

The study participants consisted of 100 nurses recruited at S University Hospital and B Municipal Hospital in South Korea who completed a written survey and 140 nurses who completed an online survey. The inclusion criteria were (a) working in a hospital in South Korea, (b) working in a COVID-19 patient ward and (c) having participated in COVID-19 patient care for more than 1 month based on the criterion that symptoms should be present for at least 1 month and that individuals have been directly or indirectly exposed to traumatic events (American Psychiatric Association & Association, 2013). Since using maximum likelihood estimation, the fit statistics can provide appropriate conclusions about the model only when the sample size is above 200 (Kline, 2015). Considering a dropout rate of 20%, the survey was distributed to 240 nurses. The sample was recruited from 27 April to 27 May 2021, and 229 surveys were analysed, excluding 11 surveys from nurses who did not answer earnestly or work in patient wards.
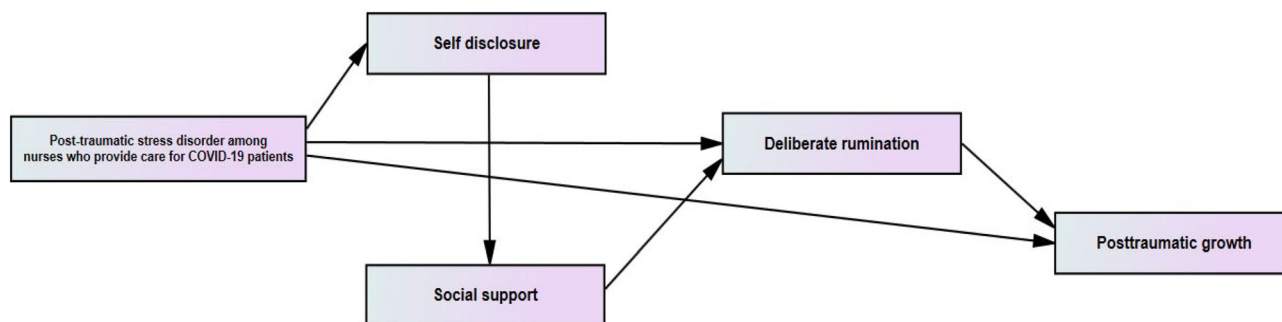
FIGURE 1 Path diagram of the hypothetical model

2.3 | Instruments

2.3.1 | Form for individual characteristics

The survey consisted of questions about age, sex, education, marital status, work experience, work position, ward type, type of beds operated for COVID-19 patients and duration of COVID-19 patient care.

2.3.2 | Posttraumatic stress disorder (PTSD)

PTSD was measured using 22 items in the Impact of Event Scale-Revised Korean version (IES-R-K), which was developed by Weiss and Marmar (Weiss, 2007) and for which the validity and reliability were examined by Eun et al. (2005) in South Korea. The items are measured with a 5-point Likert scale from 0 to 4, with a higher score indicating more severe PTSD. Based on the cut-off score suggested by Eun et al. (2005), scores of 0–17 were categorized as no PTSD, 18–24 as partial PTSD and 25 and above as PTSD. Cronbach's α reported by Eun et al. (2005) was .83, and it was .97 in this study.

2.3.3 | Self-disclosure

Self-disclosure was measured using the 12 items in the Distress Disclosure Index (DDI) developed by Kahn and Hessling (2001) and translated by Song and Lee (2013).

The DDI assesses individuals' tendency to disclose or hide emotions and thoughts about painful events they experienced using a 5-point Likert scale from 1 to 5. Cronbach's α of the scale translated by Song and Lee (2013) was .93, and it was .87 in this study.

2.3.4 | Social support

Social support was measured using a 10-item social support scale developed for the SARS epidemic by Tam et al. (2004) and translated by Park (2016). This scale consists of five items on individual support

and five items on institutional support. The items were measured with a 5-point Likert scale from 0 to 4, with higher scores indicating more sufficient social support. Cronbach's α in the study by Park (2016) was .86, and it was .86 in this study as well.

2.3.5 | Deliberate rumination

Deliberate rumination was measured using the 10 items in the Event Related Rumination Inventory in Korean (K-ERRI) developed by Cann et al. (2010) and translated and validated by Ahn et al. (2013). This scale consists of items assessing intrusive rumination and deliberate rumination, but this study only used 10 items on deliberate rumination to reflect the study aims. The items were measured using a 4-point Likert scale from 0 to 3, with higher scores indicating more deliberate rumination. Cronbach's α of the scale translated and validated by Ahn et al. (2013) was .95, and Cronbach's α was .86 in this study.

2.3.6 | Posttraumatic growth

To measure the positive changes perceived by individuals after a traumatic experience, 16 items in the Posttraumatic Growth Inventory (PTGI) developed by Tedeschi and Calhoun (1996) and revised and updated for use in South Korea by Song et al. (2009). The items are measured with a 6-point Likert scale from 0 to 5, with higher scores indicating more positive posttraumatic changes. Cronbach's α in Song et al. (2009) was .83, and Cronbach's α in this study was .92.

2.4 | Ethical considerations

This study received approval from S University Hospital and B Medical Center institutional review boards and was conducted according to the relevant guidelines (IRB No.H-2103-082-1204, IRB No.10-2021-56). It was explained to participants that the data would be kept anonymous and confidential, and the survey was administered to nurses who voluntarily agreed to participate in the study.

2.5 | Data analysis

Descriptive statistics of the collected data and correlations between variables were analysed using SPSS version 25.0. A descriptive analysis was conducted for the participants' general characteristics, PTSD, self-disclosure, social support, deliberate rumination and post-traumatic growth. A bivariate correlation analysis was conducted using Pearson correlation coefficients. Statistical significance was set at $p < 0.05$.

The hypothesis path model was estimated with AMOS version 21.0 using the maximum likelihood method, and the effect was tested within the Bootstrap 95% confidence interval to test the significance of the direct, indirect and total effects of the model.

3 | RESULTS

3.1 | Descriptives and correlations

The general characteristics of study participants are presented in Table 1. Most participants were women ($n = 208$, 90.8%), and their average age was 30.28. Most participants were staff nurses ($n = 220$,

TABLE 1 General characteristics of the subjects ($n = 229$)

Characteristics	Categories	n (%)	M ± SD
Sex	Female	208 (90.8)	
	Male	21 (9.2)	
Age (year)	≤29	108 (47.2)	30.28 ± 4.57
	30–39	113 (49.3)	
	≥40	8 (3.5)	
Marital status	Single	152 (66.4)	
	Married	77 (33.6)	
Living	Alone	107 (46.7)	
	Family	107 (46.7)	
	Others	15 (6.6)	
Education status	College	14 (6.1)	
	University	184 (80.3)	
	Over graduate	31 (13.5)	
Position	Staff nurse	220 (96.1)	
	Charge nurse	9 (3.9)	
Clinical experience (year)	<3	68 (29.7)	5.29 ± 4.01
	3 to <5	62 (27.1)	
	5 to <10	81 (35.4)	
	≥10	19 (7.9)	
Hospital type for COVID-19 treatment	Infectious disease hospitals	112 (48.9)	
	Regional hub hospitals for COVID-19 treatment	91 (39.7)	
	Other	26 (11.4)	
Type of medical institution	General hospital	208 (90.8)	
	Hospital	18 (7.9)	
	Long-term care hospital	2 (0.9)	
Department	General ward	143 (62.4)	
	ICU	65 (28.4)	
	Emergency room	21 (9.2)	
Period of caring for patients with COVID-19 (months)	<6	123 (53.7)	6.19 ± 4.43
	≥6	106 (46.3)	
PTSD cut-off	0–17	82 (35.8)	
	18–24	14 (6.1)	
	≤25	133 (58.1)	

Note: PTSD = posttraumatic stress disorder.

TABLE 2 Means, standard deviations and correlations of the observed variables ($n = 229$)

	Mean	SD	1	2	3	4	5
1. PTSD	32.73	23.44	1				
2. Self-disclosure	38.82	8.82	−.157**	1			
3. Social support	23.79	8.04	.573**	−.119*	1		
4. Deliberate rumination	17.44	5.75	.369**	.053	.404**	1	
5. Posttraumatic growth	43.80	14.65	.504**	.012	.591**	.692**	1

Note: PTSD = posttraumatic stress disorder.
*p < .05. **p < .01. ***p < .001.

96.1%), and their average length of clinical experience was 5.29 years. Regarding the types of hospitals for COVID-19 treatment, infectious disease hospitals made up 48.9% ($n = 112$), and the average duration that nurses participated in COVID-19 patient care was 6.19 months. Of the participants, 133 (58.1%) had PTSD, 14 (6.1%) had partial PTSD and 82 (35.8%) did not have PTSD.

Table 2 summarizes mean, standard deviations and the correlation matrix among the research variables. The average score for PTSD among nurses who participated in COVID-19 patient care was 32.73 ± 23.44. The average score of self-disclosure was 38.82 ± 8.82, and the average social support score was 23.79 ± 8.04. The average score of deliberate rumination was 17.44 ± 5.75, and the average score of posttraumatic growth was 43.80 ± 14.65.

PTSD had significant positive correlations with social support ($r = .573$, p < .01), deliberate rumination ($r = .369$, p < .01) and posttraumatic growth ($r = .504$, p < .01) and had a significant negative correlation with self-disclosure ($r = −.157$, p < .01). Self-disclosure had a significant negative correlation with social support ($r = −.119$, p < .05). Social support had significant positive correlations with deliberate rumination ($r = .404$, p < .01) and posttraumatic growth ($r = .591$, p < .01), and deliberate rumination had a significant positive correlation with posttraumatic growth ($r = .692$, p < .01).

3.2 | Path analysis

As a result of analysing the hypothetical model in Figure 1, the path from self-disclosure to social support (−0.12) was not significant (shown in parentheses are the standardized estimates). With respect to the hypothesized model, the fit indices were $\chi^2 = 124.133$, p < .001, GFI = 0.85, CFI = 0.66, NFI = 0.65, RMSEA = 0.36 and TLI = 0.15; all of the fitness indices were unsatisfactory.

Next, the model was modified by adding significant pathways from PTSD to social support (0.57), self-disclosure to deliberate rumination (0.12) and social support to posttraumatic growth (0.30). The fitness of the revised path model (Figure 2) was $\chi^2 = 1.380$, $p = .502$, GFI = 0.99, CFI = 1.00, NFI = 0.99, RMSEA = 0.00 and TLI = 1.01. Since the goodness-of-fit indexes were improved, the revised model fits the data better and that it was superior to the hypothesized model.

The direct, indirect and total effects focused on endogenous variables in the revised model are presented in Table 3. PTSD in nurses caring for COVID-19 patients had a significant and positive direct effect on social support (0.57), deliberate rumination (0.22) and posttraumatic growth (0.14).

But it had a significant and negative direct effect on self-disclosure (−0.16). Social support of nurses caring for COVID-19 patients had a significant and positive direct effect on deliberate rumination (0.29), and deliberate rumination had a significant and positive direct effect on posttraumatic growth (0.52).

PTSD in nurses caring for COVID-19 patients had a significant and positive indirect effect on social support (0.01), deliberate rumination (0.15) and posttraumatic growth (0.36), and social support had a significant and positive indirect effect on posttraumatic growth (0.15). Self-disclosure in nurses caring for COVID-19 patients indirectly positively affected posttraumatic growth through deliberate rumination but was not significant.

4 | DISCUSSION

This study investigated the causal relationship of variables affecting posttraumatic growth of nurses caring for COVID-19 patients.

Deliberate rumination was the variable that had the greatest influence and had a direct effect on posttraumatic growth among nurses who participated in COVID-19 patient. This result is consistent with a previous study (Cui et al., 2021) that reported an increased posttraumatic growth after deliberate rumination among nurses who provided care for COVID-19 patients. Calhoun and Tedeschi reported that pain itself does not directly promote posttraumatic growth, but instead, pain effects posttraumatic growth through mediation by deliberate rumination (Tedeschi & Calhoun, 2004). With more deliberate rumination, the opportunity for posttraumatic growth increases as individuals find meaning of the traumatic event and reconstruct new perspectives about others and the world (Xu et al., 2019). Deliberate rumination may consolidate the ability to manage emotional pain as a result of establishing higher levels of purpose and beliefs by stimulating motivation for growth (Cui et al., 2021). A study reported that greater deliberate rumination in mental health nurses who experienced traumatic events resulted in greater chance of revising negative thought patterns and recognizes positive changes, leading to
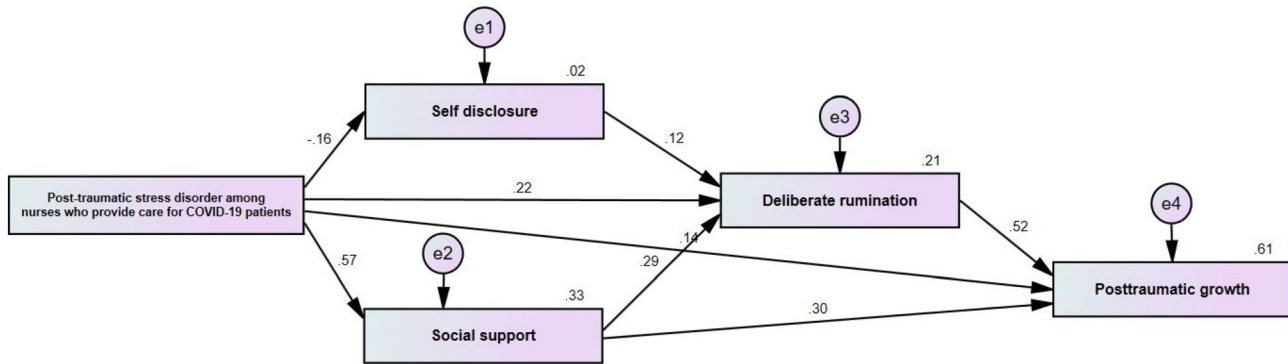
FIGURE 2 Path diagram of the modified model

TABLE 3 Standardized direct, indirect and total effects in the modified model ($n = 229$)

Endogenous variables	Exogenous variables	β (S.E.)	C.R. (p)	SMC	Direct effect	Indirect effect	Total effect
Self-disclosure	PTSD	−.16(.03)	−2.40*	.02	−.16*		−.16*
Social support	PTSD	.57(.02)	10.36***	.33	.57**	.01***	.57***
Deliberate rumination	Social support	.29(.05)	4.05***	.21	.29**		.29***
	PTSD	.22(.02)	3.05**		.22*	.15**	.37***
	Self-disclosure	.12(.04)	2.05*		.12(.08)		.12(.08)
Posttraumatic growth	Deliberate rumination	.52(.12)	11.22***	.61	.52***		.52***
	PTSD	.14(.03)	2.71**		.14*	.36**	.50***
	Social support	.30(.10)	5.75***		.29***	.15**	.45***
	Self-disclosure					.06(.08)	.06(.08)

Note: PTSD = posttraumatic stress disorder.
*$p < .05$. **$p < .01$. ***$p < .001$.

posttraumatic growth (Yeo & Park, 2020). Based on these previous studies, it is necessary to seek various intervention strategies to facilitate deliberate rumination among nurses who provide care for COVID-19 patients. Experiencing the opportunity to recognize new perspectives about life and to become motivated to grow through deliberate rumination is an important process in achieving posttraumatic growth.

PTSD among nurses who participated in COVID-19 patient care had direct and indirect effects on posttraumatic growth. It was confirmed that 64.2% of respondents experienced PTSD using a cut-off score of 18 or higher on the PTSD scale, and this figure was similar to the results of an Italian study, which reported that among health care service providers, 65% of nurses reported experiencing PTSD during COVID-19 (Lasalvia et al., 2021). In the ongoing COVID-19 situation, frontline nurses are experiencing serious psychological problems (Chen et al., 2021; Cui et al., 2021; Fernandez et al., 2020; Hu et al., 2020). Nurses faced concerns about staff shortages, fatigue from long working hours and lack of personal protective equipment and medical supplies (Fernandez et al., 2020). They also reported that direct contact with COVID-19 patients can lead to psychological health problems, such as PTSD, as they experience constant stress, such as fear and anxiety, that they may be exposed to infection or unwittingly spread it to others (Chen et al., 2021). Nevertheless, 61% of ICU nurses who received sufficient communication and information from managers showed willingness to treat for COVID-19 patient (Lord et al., 2021) and reported that PTSD was associated with posttraumatic growth (Chen et al., 2021; Cui et al., 2021; Nowicki et al., 2020). Since PTSD in nurses who participated in COVID-19 patient care can lead to negative outcomes such as burnout and turnover (Jung et al., 2020), it is necessary to seek ways to identify risk factors for the high levels of PTSD experienced by nurses and promote psychological health.

The social support of nurses who participated in COVID-19 patient care had a direct effect on deliberate rumination and had direct and indirect effects on posttraumatic growth. Nurses working in general hospitals who experienced traumatic events coped with negative psychological responses, and through social support promoted and experienced posttraumatic growth (Kim et al., 2020). However, a study of nurses who worked in a designated inpatient treatment hospital during MERS found that social support was not a significant factor in the mental health status of nurses (Park, 2016). This result can be interpreted as social support not impacting the mental health of nurses when nurses perceived a lack of personnel to provide patient care and excessive workload as infection management

guidelines and protocols changed (Park, 2016). A study of nurses who participated in the COVID-19 infectious disease response also reported that nurses experienced difficulties due to inaccurate response guidelines, adjustment in work distribution across departments and excessive workload (Jin & Lee, 2020). Despite the difficulties of the situation, nurses who provided care for COVID-19 patients experienced the support of friends and family, gratitude from patients and comradery from coworkers who were considerate and encouraging (Lee & Lee, 2020). Additionally, nurses who are received psychological interventions or training on the front line of COVID-19 maintained positive emotions and controlled negative emotions, resulting in high levels of posttraumatic growth (Cui et al., 2021). Therefore, in order for social support to promote posttraumatic growth of nurses who participated in COVID-19 patient care, it is necessary to improve the nursing environment by establishing relevant policies that strengthen the infectious disease management system at the institutional and social levels.

The most notable result of this study was that self-disclosure of nurses who participated in COVID-19 patient care had a direct effect on deliberate rumination and indirect effect on posttraumatic growth, but it was not significant. According to Calhoun and Tedeschi's model of posttraumatic growth, individuals expose their traumatic experiences to those around them to alleviate pain, thereby increasing interpersonal relationships as well as forming a solid support system (Tedeschi & Calhoun, 2004). Structural analysis of posttraumatic growth related variables for psychiatric nurses also showed that self-disclosure was high when pain perception was high, and social support was significantly higher as self-disclosure was high (Yeo & Park, 2020). However, in this study, unlike previous studies (Tedeschi & Calhoun, 2004; Yeo & Park, 2020), nurses who participated in COVID-19 patient care showed low self-disclosure despite experiencing intense PTSD. Nurses who were in direct contact with COVID-19 patients experienced social isolation due to anxiety that they might become a source of infection and negative views from those around them (Fernandez et al., 2020). Moreover, the highly infectious nature of COVID-19 compared to previous infectious diseases stigmatized COVID-19 patients and the nurses caring for them (Lee & Lee, 2020). Self-disclosure reduces the inhibition and avoidance of thoughts and emotions caused by traumatic events and is an important variable in achieving appropriate social support and posttraumatic growth (Yeo & Park, 2020). Therefore, education and encouragement on self-disclosure are needed to support constructive self-disclosure that directs PTSD among nurses who participated in COVID-19 patient care in a positive direction and to convert PTSD to posttraumatic growth.

Considering reports of severe psychological problems in nurses caring for patients in unfamiliar situations where COVID-19 continues (Chen et al., 2021; Cui et al., 2021; Fernandez et al., 2020; Hu et al., 2020), constructive self-disclosure should be supported and active interventions should be planned. The results of the study are expected to provide an opportunity to shift in a positive direction by reducing the PTSD of nurses caring for COVID-19 patients.

4.1 | Study limitations

Although this study investigated the prevalence of PTSD in nurses caring for COVID-19 patients and explored predictors of posttraumatic growth, caution should be exercised in interpreting and generalizing its findings. In this study, 90.8% of the participants worked in general hospitals and 62.4% in wards, so there is a limit to generalizing the findings to nurses caring for COVID-19 patients in various medical institutions and departments. Therefore, further research should select a larger sample size in consideration of various medical institutions and departments, and repeated studies should be conducted to investigate the major variables leading to posttraumatic growth of nurses caring for COVID-19 patients.

4.2 | Implications for nursing management

As COVID-19 continues to be a global public health crisis, it is very important in terms of human management to understand the psychological health among nurses who participated in COVID-19 patient. However, due to insufficient self-disclosure of PTSD experienced by nurses on the frontline of COVID-19, psychological intervention or appropriate social support may not be provided for them, and they may have an attention bias to negative emotions. This may lower the quality of care provided to patients and lead to negative consequences such as burnout or turnover of nurses. Therefore, based on the results of this study, hospital organisations and nursing managers should provide psychological and social support that encourage disclosing PTSD of nurses who care for COVID-19 patients. Hospitals and nursing managers must guide nurses who experience posttraumatic stress disorder as they progress towards posttraumatic growth through intentional and constructive reflection.

CONFLICT OF INTEREST
None of the authors has any conflict of interest to disclose.

AUTHOR CONTRIBUTIONS
Ju Young Yim contributed to the study conception, design, data management, data interpretation and writing of the manuscript. Jung A Kim contributed to the study conception, design, statistical analysis, data interpretation and manuscript editing. All authors contributed to the preparation of the manuscript and approved the final submitted version.

ETHICS STATEMENT
This study was conducted with the approvals of the Seoul National University Hospital (IRB NO: H-2103-082-1204) and the Seoul Metropolitan Government-Seoul National University Boramae Medical Center (IRB No: 10-2021-56).

DATA AVAILABILITY STATEMENT

Research data are not shared.

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