International Journal of Stress Management

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Online First Publication, December 7, 2023. https://dx.doi.org/10.1037/str0000314

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ISSN: 1072-5245
https://doi.org/10.1037/str0000314

Gain From Pain: Exploring Vicarious Posttraumatic Growth and Its Facilitators Among Health Care Workers Across Two Consecutive Lockdowns During the COVID-19 Pandemic

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This study examined the potential facilitators of vicarious posttraumatic growth (VPTG; i.e., secondary traumatic stress symptoms—STS, resilience, coping strategies), the interspecialty differences in VPTG among medical (i.e., physicians and nurses) and nonmedical health care workers (HCWs; i.e., psychologists and social workers) across two consecutive lockdowns (T1 and T2), and the mediating role of the coping strategies in the STS–VPTG relationship. A sample of 1,076 HCWs (752 medical and 324 nonmedical) completed a web-based survey during two lockdowns. The Posttraumatic Growth Inventory was used to measure VPTG, whereas the Secondary Traumatic Stress Scale, the Brief Resilience Scale, and the Brief Coping Orientation to Problems Experienced Inventory were used to assess potential VPTG indicators. At T2, after controlling for gender and age, all participants reported significantly lower STS scores. Regarding PTGI scores, after controlling for gender and age, an interaction effect was observed between time point and specialty: At T1, the nonmedical HCWs reported higher PTGI scores compared to the medical HCWs, whereas at T2 the medical HCWs reported higher PTGI scores compared to the nonmedical HCWs. VPTG was positively predicted by time point (higher scores in T2), Secondary Traumatic Stress Scale intrusive symptoms, and the coping strategies of active coping, instrumental support, positive reframing, religion, and denial, and negatively predicted by gender, education, and substance use. These coping strategies fully mediated the relationship between intrusion and VPTG. Policies should enhance resources for HCWs at risk of STS and promote VPTG as an important contribution to their ability to deliver high-quality care.

Keywords: intrusion, coping mechanisms, posttraumatic growth, repeated cross-sectional survey, coronavirus

Health care workers (HCWs) have experienced significant challenges due to the COVID-19 pandemic (e.g., uncertainties and fears associated with the virus), with short- and long-term detrimental effects on their mental health (Moreno-Jiménez et al., 2021). Through the pandemic, the roles of the medical HCWs, such as physicians and nurses, and the nonmedical HCWs, such as psychologists and social workers, have been crucial in treating and supporting individuals with COVID-19 traumatic experiences (Grover et al., 2020).

Empirical evidence (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022; Zhou et al., 2021) has suggested that HCWs' vicarious

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The authors would like to thank all the participants in this study. The authors truly appreciate their time. 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 article.

Data will be available upon request. The article as a whole or parts of it have not been presented anywhere or in any way prior to this submission.

Argyroula E. Kalaitzaki, Alexandra Tamiolaki, George Tsouvelas, Maria Theodoratou, and George Konstantakopoulos contributed to conceptualization, methodology, data collection, and writing–review and editing. George Tsouvelas contributed to data analysis. Argyroula E. Kalaitzaki, Alexandra Tamiolaki, George Tsouvelas, and George Konstantakopoulos contributed to writing–original draft. Argyroula E. Kalaitzaki and George Konstantakopoulos contributed to supervision. Argyroula E. Kalaitzaki contributed to project administration. All authors have read and agreed to the published version of the article.

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exposure to the traumatic experiences of direct trauma survivors may have both negative and positive psychological consequences. The negative outcomes have been called secondary traumatic stress (STS), and the positive ones are referred to as vicarious posttraumatic growth (VPTG). STS has been defined as the stress resulting from helping others who are suffering (Morrison & Joy, 2016). Manifestations of STS include intrusive thoughts, a tendency to avoid whatever is associated with the event or reminds of it, and hyperarousal (Morrison & Joy, 2016). HCWs' debilitated physical and mental health and medical errors are frequently reported negative consequences of STS (Jones et al., 2021). A less studied term is VPTG, which refers to the positive changes that HCWs may indirectly gain from working with victims of trauma. Manifestations of VPTG include increased appreciation of life, improved relationships with others, enhanced spiritual faith, empowerment of the self, and discovery of new possibilities (Arnold et al., 2005). VPTG has been associated with less depression and anxiety, increased well-being and life satisfaction in nurses (Helgeson et al., 2006) and has been shown to reduce the association between pandemic-related distress and poor psychological adjustment (Aggar et al., 2022).

As the pandemic continues to surge, further research at different time points could better clarify the course of the effects of the COVID-19 pandemic on HCWs' mental health. Identifying HCWs at risk (i.e., with high levels of STS and low levels of VPTG) will allow health care policies to develop and implement interventions to support HCWs in their workplace and safeguard their mental health and well-being, which are key determinants of their ability to deliver high-quality care. This study is part of a nationwide survey that collects data at repeated time points during the COVID-19 pandemic related to its positive and negative effects on HCWs' mental health in Greece. The present survey reports data on the second lockdown and builds upon those collected at the first one (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022).

The conservation of resource theory (COR; Hobfoll, 1989) offers a theoretical framework to explain how actual or threatened loss of resources or failure of resource investment to yield resource gain activates stress responses and how people invest resources to avoid further resource loss, recover from loss, and gain resources. Undoubtedly, the COVID-19 pandemic has been a traumatic experience universally, as it was intertwined with resource losses (Wang et al., 2022), both real and perceived, such as financial losses and unemployment, interruption of social interactions, serious illness or health threats, and death. A literature review has also shown that resource loss has been associated with trauma-related mental distress, whereas resource gain is beneficial in reducing distress after traumatic exposure (Hollifield et al., 2016). Similarly, the COVID-19 literature has also shown that pandemic-related resource loss is associated with mental distress (McElroy-Heltzel et al., 2022).

Another theory relevant to the COVID-19 pandemic could be the terror management theory (Greenberg et al., 1986; Pyszczynski et al., 2021). The terror management theory posits that awareness of the inevitability of death results in stress, which is managed by maintaining faith in one's cultural worldviews, self-esteem, and close relationships. However, the pandemic, specifically the virus-related threat of death, undermined those three anxiety-buffering components that people use to reduce stress (e.g., challenging one's worldview and self-esteem, and increasing social isolation), thus making it more difficult to manage the terror of death.

Studies so far have examined the prevalence of STS among various specialties of HCWs with a particular emphasis on medical HCWs such as physicians and nurses (De Kock et al., 2021; Y. J. Lee, Yun, et al., 2021; Zhou et al., 2021). During the first wave of COVID-19, Litam and Balkin (2021) argued that physicians experienced slightly higher levels of STS compared to nurses, and Orrù et al. (2021) found that frontline physicians and nurses experienced greater STS compared to HCWs working in other units. In their meta-analysis, Batra et al. (2020) found that 11.4% of the HCWs suffered from posttraumatic stress syndrome, with frontline HCWs exhibiting higher levels of anxiety and depression compared to the second-line ones. A recent study found no significant association between direct contact with COVID-19 patients and levels of anxiety, depression, or stress among medical HCWs (Hummel et al., 2021). During the second wave, Y. J. Lee, Yun, et al. (2021) found that STS among physicians and nurses working in isolation wards was significantly higher than among those physicians and nurses working in critical care units. Moreno-Jiménez et al. (2021) study is the only one so far that has reported differences between nurses and physicians at two time points (the first wave and the beginning of the second one); although the symptoms of STS in the first wave resulted in higher STS symptoms in the second one, there were no significant interspecialty differences. To the authors' knowledge, only one study so far has compared the mental health of medical and nonmedical HCWs (Hummel et al., 2021); it was found that nonmedical HCWs had significantly higher levels of depression and anxiety compared to the medical HCWs.

The COVID-19-related mental health literature has already acknowledged that some HCWs have experienced VPTG (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022; Lyu et al., 2021). Nurses have been the most studied group. It was found that higher levels of VPTG have been achieved by frontline nurses compared to nonfrontline nurses during both the first wave of the pandemic (Chen et al., 2021; Li et al., 2022) and the second one (M. S. Lee, Shin, et al., 2021). During the peak of the second wave, Moreno-Jiménez et al. (2021) found that nurses experienced higher VPTG than physicians. Interestingly, no study has yet reported VPTG findings among nonmedical HCWs, and neither has examined interspecialty differences in VPTG among medical and nonmedical groups of HCWs at different time points across the pandemic. However, distinct groups of HCWs have been reported to differ in their potential to develop VPTG (Manning-Jones et al., 2016), and many factors may account for differences in VPTG between different HCWs groups (e.g., differences in workplace culture, the degree of contact with the traumatized patients, the amount of time HCWs spend with them, the nature of the treatment and care they offer, and their professional training; Manning-Jones et al., 2016).

Data from HCWs during the pandemic may provide a better understanding of the factors that potentially promote HCWs' VPTG. Studies have shown that some of the most crucial psychosocial factors associated with VPTG during the COVID-19 pandemic were STS (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022), resilience (Finstad et al., 2021; Jung & Park, 2021; Lyu et al., 2021), and coping strategies (Finstad et al., 2021; A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022). These internal resources (e.g., resilience and coping strategies) have been suggested by COR theory (Hobfoll et al., 2015) to buffer people against the adverse mental health effects of resource loss/stress. According to Helgeson et al. (2006), STS symptoms can facilitate positive changes. Experiencing

STS symptoms may be a hint that people are working through the implications of a challenging event, and the result of this process could lead to VPTG. Joseph et al. (2012) suggested that an event must be challenging enough to promote growth but not extremely challenging to inhibit growth. Based on a previous study (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022) during the first wave of the COVID-19 pandemic, moderate levels of STS were associated with VPTG in HCWs. However, the potential association of STS with VPTG in HCWs at different time points during the pandemic needs to be examined.

Resilience, defined as the ability to adapt or bounce back from extremely unfavorable circumstances (Carver, 1997), has also been associated with VPTG during the COVID-19 pandemic (Finstad et al., 2021). Yıldız (2021) have proposed that resilient people tend to adapt to challenging situations and conceptualize problems as a call to action, and this positive mindset helps them find meaning in adversity. Research findings on the relationship between resilience and VPTG are still inconclusive. Some studies suggest a positive association between resilience and VPTG in HCWs (Jung & Park, 2021; Lyu et al., 2021), whereas other studies have found that resilience may inhibit VPTG since challenging events may have little impact on high-resilient people (Wu et al., 2015). Given the inconsistent findings, the role of resilience in VPTG in HCWs warrants further investigation.

Coping strategies can be defined as the set of adaptive (e.g., positive reframing, religious coping, use of emotional support) and maladaptive (e.g., self-blame, denial, substance use) cognitive and behavioral resources individuals use to deal with adverse events (Meyer, 2001). Adaptive strategies face the problem and try to deal with it, such as reappraisal and solution-focused actions, whereas maladaptive strategies turn away from the problem, such as denying and self-criticism. During the first wave of the COVID-19 pandemic, a mixture of adaptive and maladaptive strategies were predicted (Asmundson et al., 2021; A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022). Indisputably, adaptive strategies have been associated with long-term positive outcomes. However, maladaptive strategies may also have positive outcomes in the short term, such as temporary relief from challenging circumstances (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022; Ziarko et al., 2021), though continued use of them may lead to deteriorating health in the long run. Since time needs to be considered when examining the effectiveness of the coping strategies employed during the COVID-19 crisis, the association of the coping strategies with VPTG among HCWs at different time points merits further examination.

Based on the relevant literature and drawing on a previous study (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022), the purpose of this study was to examine (a) the interspecialty differences in STS and VPTG among medical (physicians and nurses) and nonmedical HCWs (psychologists and social workers) during the first and second lockdowns in Greece, (b) the potential facilitators of VPTG (STS, resilience, and coping strategies) during the same two lockdowns, and (c) the potential mediating role of the coping strategies in the relationship between STS and VPTG. We hypothesized that:

1. Medical HCWs would achieve higher levels of STS and VPTG than nonmedical HCWs during the second lockdown compared to the first one;
2. STS symptoms, resilience, and mostly adaptive coping strategies would contribute to higher levels of VPTG, and they would be considered facilitators of VPTG;
3. Adaptive coping strategies would mediate the relationship between STS and VPTG.

Method

Participants

A total of 1,076 HCWs completed an online questionnaire, 647 during the first COVID-19 lockdown (Time Point 1—T1) and 429 during the second lockdown (Time Point 2—T2). Anomaly detection models were used to identify outliers or unusual cases. Cases with an anomaly index value greater than 2 were considered anomaly candidates (International Business Machines Corporation, 2021). Ninety-two participants (8.6%) of the 1,076 reported that they had participated in both measurements (T1 and T2). After controlling for outliers with anomaly detection techniques, no cases were excluded. Of the participants, 752 were medical HCWs (nurses and physicians), and 324 were nonmedical HCWs (psychologists and social workers). The majority of them were nurses (39.9%) and physicians (30%), followed by psychologists (19.6%) and social workers (10.5%). Table 1 displays the detailed sociodemographic characteristics of the medical and nonmedical HCWs.

Study Design and Procedure

This repeated cross-sectional survey reports data collected at two time points: during the first and second COVID-19 lockdowns in Greece. The first lockdown (March 23, 2020–May 03, 2020) was imposed soon after the first very few confirmed cases, whereas the second lockdown (November 7, 2020–May 30, 2021) was the result of a rapid increase in confirmed cases (https://covid19.who.int/region/euro/country/gr). Data were collected amid the first lockdown, signifying the first time point (T1) of the study, and amid the second lockdown, signifying the second time point (T2) of the study. Using convenience and snowball sampling, the questionnaire was distributed online at both time points through the authors' personal contacts and posted on social networking sites and webpages. Participants were requested to invite their contacts and post the questionnaire on their social networking sites. An informed consent statement was included on the first page of the questionnaire. The study was in accordance with the 1964 Helsinki Declaration and its later amendments. Approval of the study was obtained from the Research Ethics Committee of the Hellenic Mediterranean University (125/17-10-2022).

Measures

A web-based self-report questionnaire was developed that consisted of demographic questions (e.g., sex, age, marital status, education; see Table 1) and instruments assessing the psychological impact (STS and VPTG) and the coping strategies used to deal with COVID-19. In this study, the Greek versions of the following instruments were used (A. Kalaitzaki, 2021).

The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), consisting of 21 items, measures VPTG in five domains: personal strength, relating to others, new possibilities, appreciation of life, and spiritual change. Items were scored on a 6-point scale, ranging from 0 (*I did not experience this change*) to 5 (*I experienced this change to a very large extent*). Participants were

Table 1
Sociodemographic Characteristics of the Medical and Nonmedical Health Care Workers

Sociodemographic characteristics	Total sample (N = 1,076)		Medical (N = 752)		Nonmedical (N = 324)	
	N	%	*N*	%	*N*	%
Time point						
First lockdown	647	60.1	499	66.4	148	45.7
Second lockdown	429	39.9	253	33.6	176	54.3
Gender (female)	842	78.3	565	75.1	277	85.5
Age	41.6	10.05	43.52	9.87	37.0	8.91
Children (yes)	545	55.8	419	55.7	126	38.9
Family status						
Single	354	32.9	201	26.7	153	47.2
Married	620	57.6	474	63.0	146	45.1
Other	102	9.5	77	10.2	25	7.7
Educational level						
Technical education	99	9.2	94	12.5	5	1.5
University	481	44.7	382	50.8	99	30.6
Master/PhD	496	46.1	276	36.7	220	67.9
Work experience						
0–5 years	267	24.8	139	18.5	128	39.5
6–10 years	154	14.3	87	11.6	67	20.7
11–15 years	218	20.3	162	21.5	56	17.3
16–20 years	168	15.6	124	16.5	44	13.6
21–25 years	138	12.8	121	16.1	17	5.2
26–30 years	27	2.5	23	3.1	4	1.2
Up to 31 years	104	9.7	96	12.8	8	2.5
Specialty						
Doctors	323	30.0	323	43.0		
Nurses	429	39.9	429	57.0		
Psychologists	211	19.6			211	65.1
Social workers	113	10.5			113	34.9
Professional group						
Medical health care workers	752	69.9				
Nonmedical health care workers	324	30.1				

Note. Age is presented in mean and standard deviation.

instructed to respond regarding the change that occurred following the COVID-19 lockdown. Example items are "I changed my priorities about what is important in life" (appreciation of life) and "I have a better understanding of spiritual matters" (spiritual change). A total score ranging from 0 to 125 and five subscale scores were produced, with higher scores indicating higher levels of growth. In the present study, Cronbach α reliability coefficients were .95 and .96 for the sample at T1 and T2, respectively, and 0.95 for the whole sample (two time points combined).

The Secondary Traumatic Stress Scale (STSS; Bride et al., 2004) consists of 17 items, allocated in three subscales (intrusions, avoidance, and hyperarousal), measuring the intensity of STS related to the COVID-19 lockdown experienced in the past 7 days. Items are scored on a 5-point scale, ranging from 1 (*never*) to 5 (*very often*). Example items are "Reminders of my work with clients upset me" (intrusion) and "I noticed gaps in my memory about clients' sessions" (avoidance). A total score ranging from 17 to 85 and three subscale scores were produced (range of scores: 5–25 for Intrusion, 7–35 for Avoidance, and 5–25 for Arousal), with higher scores indicating higher levels of STS. In the present study, Cronbach α reliability coefficients were .91 and .94 for the sample at T1 and T2, respectively, and .92 for the whole sample (two time points combined). Cronbach αs for the subscales ranged from .80 to .83.

The Brief Coping Orientation to Problems Experienced Inventory (COPE; Carver, 1997), consisting of 28 items allocated in 14 subscales, assesses coping strategies during lockdown (see Table 2, for the 14 coping strategies). Example items are: "I've been trying to see it in a different light, to make it seem more positive" (positive reframing) and "I've been getting help and advice from other people" (use of instrumental support). The participants indicated how often they were using each strategy to deal with the COVID-19 lockdown, using a 4-point scale ranging from 1 (*I have not been doing this at all*) to 4 (*I have been doing this a lot*). Subscale scores are produced by summing the respective two items. In the present study, Cronbach α reliability coefficients were .86 and .82 for the sample at T1 and T2, respectively, and .85 for the whole sample (two time points combined). Cronbach αs for the subscales ranged from .53 to .92.

The Brief Resilience Scale (Smith et al., 2008), consisting of six items, measures one's ability to bounce back or recover after stressors (such as the lockdown). Items are scored on a 5-point scale ranging from 0 (*strongly disagree*) to 5 (*strongly agree*). Example items are: "I tend to bounce back quickly after hard times" and "I tend to take a long time to get over set-backs in my life." A total score, ranging from 6 to 30, is produced by summing the six items. Higher scores indicate high levels of psychological resilience. In the present study, Cronbach α reliability coefficients were .76 and .70 for the sample at T1 and T2, respectively, and .74 for the whole sample (two time points combined).

Statistical Analyses

Two two-way analyses of covariance (ANCOVAs) were performed to examine the interaction effect of time point (first and second lockdown; T1 and T2) and professional group (medical and nonmedical) on STSS and PTGI scores after controlling for age and gender. The Pearson product–moment correlation coefficient or the point-biserial correlation coefficient (for dichotomous variables) was computed to estimate associations between PTGI scores and both sociodemographic and study variables. The statistically significant bivariate correlations were entered in the regression analysis. A hierarchical multiple regression analysis using stepwise method was conducted to investigate the prediction of PTGI scores by the significantly correlated sociodemographic and study variables (STSS subscales, resilience, and COPE subscales). The final model retained all variables at the 0.05 level or less. The expectation-maximization imputation algorithm was used to estimate missing values.

A mediation analysis, using maximum likelihood estimation, was carried out with Analysis of a Moment Structures Version 20 (Arbuckle, 2011) to test the mediating effect of the coping strategies on the relationship between STSS and PTGI scores. Only the variables found to be significant predictors of PTGI in the final regression model were entered in the mediation analysis. Indirect effects were estimated with parametric bootstrapping of standard errors across 2,000 samples. Model fit indices were assessed with the comparative fit index, Tucker–Lewis index, incremental fit index, root-mean-square error of approximation, and standardized root-mean-square residual (Hooper et al., 2008; Hu & Bentler, 1999). Changes were made if the modification indices suggested improvement of the model fit (Byrne et al., 1989).

Table 2
Correlations of Vicarious Posttraumatic Growth (VPTG) With Demographic and Study Variables

Study variable	Total sample (N = 1,076)	Sample in T1 (N = 647)	Sample in T2 (N = 429)
STS intrusion	.22**	.26**	.19**
STS avoidance	.13**	.17**	.09
STS arousal	.12**	.17**	.10*
STS total	.17**	.21**	.13**
COPE self distraction	.10**	.14**	.10*
COPE active coping	.27**	.28**	.24**
COPE denial	.17**	.19**	.15**
COPE substance use	−.10**	−.11**	−.12*
COPE use of emotional support	.24**	.25**	.18**
COPE use of instrumental support	.28**	.31**	.20**
COPE behavioral disengagement	−.04	.00	−.12*
COPE venting	.22**	.25**	.13**
COPE positive reframing	.31**	.33**	.32**
COPE planning	.18**	.21**	.13**
COPE humor	.07*	.09*	.05
COPE acceptance	.10**	.14**	.10*
COPE religion	.37**	.37**	.37**
COPE self-blame	.16**	.16**	.10*
Resilience	.03	.04	.03
Gender	−.17**	−.19**	−.10*
Age	−.06	−.09*	.05
Education	−.13**	−.14**	−.13**
Work experience	−.03	−.05	.05
Medical HCW versus nonmedical HCW	.02	−.06	.16**

Note. For gender, 1 = male, 0 = female; for education, 1 = technical education, 2 = university, 3 = master/PhD; for medical HCW versus nonmedical HCW, 1 = health care worker, 0 = mental health care worker. T1 = Time Point 1; T2 = Time Point 2; STS = secondary traumatic stress; COPE = Coping Orientation to Problems Experienced Inventory; HCW = health care worker.
* $p < .05$. ** $p < .01$.

Results

The Effect of Time Point and Professional Group on STSS and PTGI Scores

A two-way ANCOVA examined the effect of time point (T1 and T2) and professional group (medical and nonmedical HCWs) on STSS scores after controlling for age and gender. The main effects of the independent factors were statistically significant, $F(5, 1068) = 20.23$, $p < .001$, $\eta^2 = .086$. It was shown that there was a significant main effect of time point, $F(1, 1068) = 17.35$, $p < .001$, $\eta^2 = .016$, and professional group, $F(1, 1068) = 39.78$, $p < .001$, $\eta^2 = .036$, on STSS scores after controlling for age and gender. Multiple comparisons with Bonferroni correction validated statistically significant differences regarding specialty. At T2, both medical and nonmedical HCWs presented lower STSS scores ($M = 35.47$, $SE = 0.65$) compared to T1 ($M = 39.18$, $SE = 0.61$). Medical HCWs reported significantly higher STSS scores ($M = 40.20$, $SE = 0.50$) compared to the nonmedical ones ($M = 34.44$, $SE = 0.75$). However, there was not a statistically significant interaction between the effects of the two independent variables on STSS scores, $F(1, 1068) = 0.07$, $p = .787$, $\eta^2 < .001$. A second two-way ANCOVA examined the effect of time point (T1 and T2) and professional group (medical and nonmedical HCWs) on PTGI scores, after controlling for age and gender. The main effects of the independent factors were statistically significant, $F(5, 1068) = 10.33$, $p < .001$, $\eta^2 = .046$. It was shown that there was neither a significant main effect of time point, $F(1, 1068) = 2.25$, $p = .134$, $\eta^2 = .002$, nor professional group, $F(1, 1068) = 3.82$, $p = .051$, $\eta^2 = .004$, on PTGI scores. As expected, multiple comparisons with Bonferroni correction did not show statistically significant differences regarding specialty and time point.

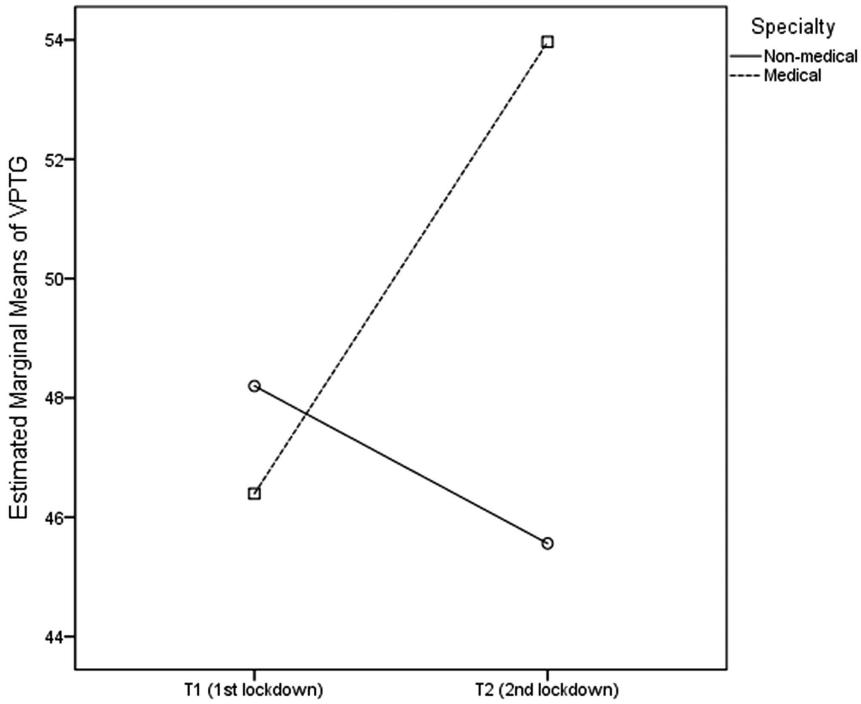
However, there was a statistically significant interaction between the effects of the two independent variables on PTGI scores, $F(1, 1068) = 9.83$, $p = .002$, $\eta^2 = .009$. After Bonferroni correction of the family-wise error (the adjusted p value is .025), the statistically significant interaction effect was confirmed. As shown in Figure 1, at T1, the nonmedical HCWs reported higher PTGI scores ($M = 48.20$, $SE = 1.99$) compared to the medical HCWs ($M = 46.40$, $SE = 1.11$), whereas at T2, the medical HCWs reported higher scores ($M = 53.97$, $SE = 1.51$) compared to the nonmedical HCWs ($M = 45.56$, $SE = 1.86$).

Facilitators of PTGI Scores

We tested the correlations of PTGI scores with the study variables (STSS subscales, resilience, and COPE subscales), demographics (gender, age, education, and contact with positive COVID-19 cases), time point, and professional group to decide which would enter into the regression analysis (Table 2). Since similar patterns of correlations were observed between T1 and T2 measurements, one regression analysis was considered appropriate rather than two (one for each time point). The variables that significantly correlated with PTGI scores were introduced as potential predictors in a hierarchical multiple regression analysis of three steps (represented as dotted lines in Table 2). Sociodemographic factors (gender and educational level) were introduced in the first step, time point was introduced in the second step, and the STSS subscales of Intrusion, Avoidance,

Figure 1

Interaction Effect of Time Point (Lockdowns) and Professional Group (Medical vs. Nonmedical) on Vicarious Posttraumatic Growth (VPTG), After Controlling for Gender and Age (ANCOVA; N = 1,076)



Note. Covariates appearing in the model are evaluated at the following values: Gender = .22, Age = 41.57; for gender 0 = female, 1 = male. ANCOVA = analysis of covariance; T1 = Time Point 1; T2 = Time Point 2.

and Arousal, along with all coping strategies (except the behavioral disengagement) were entered into the third step. Regression analysis was statistically significant, $F(10, 1064) = 39.44$, $p < .001$; $R = 0.52$, $R^2 = 0.27$, adjusted $R^2 = 0.26$, and PTGI scores were predicted by time point of measurement, with higher levels in T2 (i.e., lockdown), education (inversely), Intrusion, Active Coping, Denial, Substance Use (inversely), Use of Instrumental Support, Positive Reframing, and Religion. Whereas gender was initially introduced as a predictor, in the last step, its effect was no longer statistically significant (see Table 3).

Intrusion, Coping Strategies, and PTGI Scores

A structural equation model examined the mediating effect of the coping strategies that were significantly associated with PTGI scores (i.e., positive reframing, instrumental support, active coping, religious, and denial) in the relationship between Intrusion and PTGI scores. The entire data set from both time points (i.e., T1 and T2) was used in the analysis. A parsimonious number of correlated error terms was decided to improve model fit after inspecting the modification indices. Correlations between the same concepts were included, which are well grounded in preexisting theory. The only exception to this was the correlation between the errors of religion (COVID-19-related coping strategies) and those of spiritual change (PTGI). However, this choice was theoretically justified by the fact that religion and spiritual change are similar concepts. The modified model fit the data significantly better when it did not include the correlated error terms with the largest modification indices. The final model demonstrated acceptable model fit; chi-square value, CMIN = 478.47, degrees of freedom, DF = 76, $p < .001$; comparative fit index = .95; incremental fit index = .95; Tucker–Lewis index = .93; root-mean-square error of approximation = .07 (LO = .06, HI = .08); standardized root-mean-square residual = .07. Although the direct effect of intrusion on PTGI was statistically significant, when entering the mediator (coping strategies), this effect was no longer significant, but rather the indirect effect of intrusion on PTGI through the mediating role of coping strategies was statistically significant. Therefore, coping strategies fully mediated the Intrusion–PTGI relationship (see Figure 2).

Discussion

To our knowledge, the present study is the first to examine prevalence rates of STS and VPTG (as measured with STSS and PTGI, respectively) during two consecutive COVID-19 lockdowns among medical and nonmedical HCWs, explore potential facilitators of VPTG, and develop a mediation model in the STS–VPTG relationship.

Medical HCWs had higher STSS scores than nonmedical ones at both time points. This finding may reflect the higher levels of vicarious traumatic exposure in the medical HCWs compared to the

Table 3

Hierarchical Regression Analysis for Predicting Vicarious Posttraumatic Growth (VPTG) by Demographic Factors, Secondary Traumatic Stress, and Coping Strategies (N = 1,076)

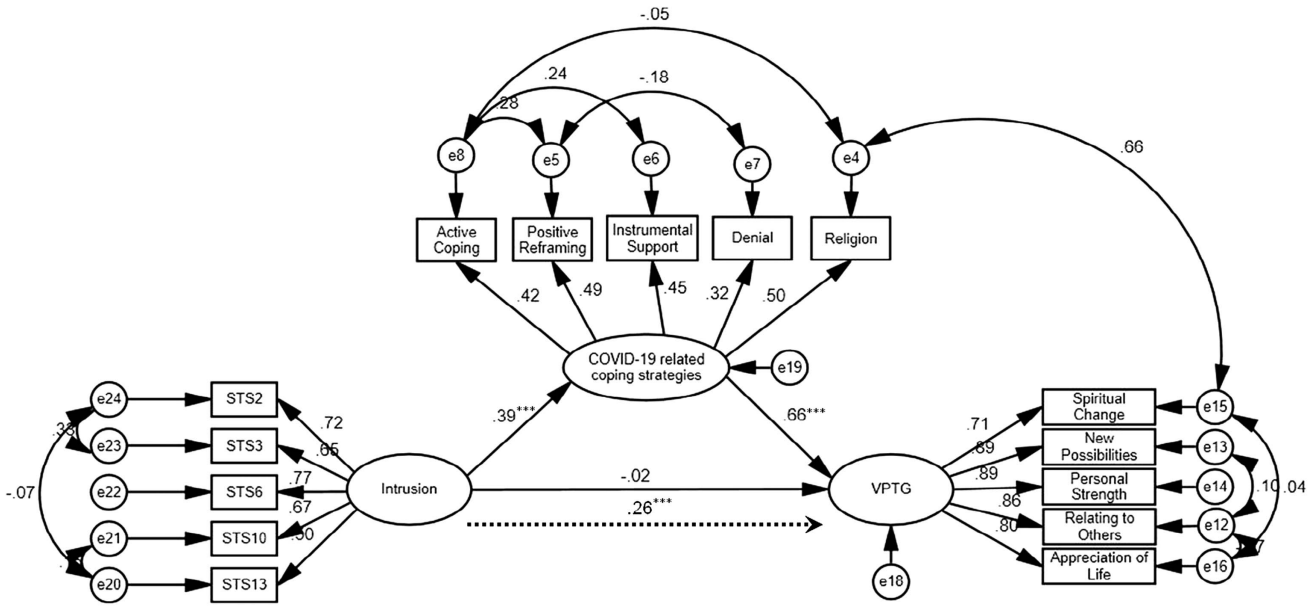
Predictor	Step (ΔR^2)	*B*	*SE*	*b*	*t*
Gender	1 (0.028)	−2.62	1.62	-0.04^{ns}	-1.61^{ns}
Education	2 (0.017)	−3.62	1.02	-0.10^{***}	-3.55^{***}
Time point	3 (0.007)	4.98	1.40	0.10^{***}	3.56^{***}
STS intrusion	7 (0.014)	0.55	0.16	0.10^{***}	3.36^{***}
STS avoidance					
STS arousal					
COPE self distraction					
COPE active coping	9 (0.006)	1.48	0.52	0.09^{**}	2.88^{**}
COPE denial	10 (0.004)	1.21	0.48	0.07^{*}	2.53^{*}
COPE substance use	8 (0.009)	−2.65	0.65	-0.11^{***}	-4.05^{***}
COPE use emotional support					
COPE use instrumental support	6 (0.018)	1.56	0.41	0.11^{***}	3.75^{***}
COPE venting					
COPE positive reframing	5 (0.052)	2.80	0.49	0.18^{***}	5.76^{***}
COPE planning					
COPE humor					
COPE acceptance					
COPE religion	4 (0.115)	2.93	0.38	0.22^{***}	7.75^{***}
R^2			0.27		
F^2			0.37		

Note. For gender, 1 = male, 0 = female; for education, 1 = technical education, 2 = university, 3 = master/PhD; for time point, 0 = first lockdown, 1 = second lockdown. ΔR^2 is the incremental increase in the model R^2 resulting from one step to another. The indicators in the table are those of the final regression model. *SE* = standard error; STS = secondary traumatic stress; COPE = Coping Orientation to Problems Experienced Inventory; ns = not statistically significant.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

nonmedical ones (Batra et al., 2020). Since medical HCWs' role involves extensive and closer contact with suffering or dying patients, they could likely be emotionally involved with them as they witness their devastating experiences, and in turn, they may be more vulnerable to stress and at a higher risk of developing STS. This assumption is consistent with COR theory (Hobfoll, 1989, 2010): Well-being is negatively affected by lost resources (e.g., loss of calmness and serenity, not to mention excessive workload and loss

Figure 2

Mediating Effects of the Effective COVID-19-Related Coping Strategies in the Relationship Between Intrusion and Vicarious Posttraumatic Growth (VPTG)



Note. The standardized path coefficients are presented. The dotted lines refer to indirect effects (N = 1,076).
$^{***}p < .001$.

of free time). Should medical HCWs be more vulnerable than nonmedical ones, the cumulative effect of resource losses due to pandemic-specific stressors may have made them even more vulnerable to stress (Hobfoll et al., 2015). In fact, Hobfoll et al. (2003) have suggested that resource loss may have a disproportionately greater negative impact on mental health than resource gain. Studies during the COVID-19 pandemic (e.g., McElroy-Heltzel et al., 2022) have corroborated this assumption. Therefore, it seemed plausible for medical HCWs to experience more losses than nonmedical HCWs, thus having higher STSS scores at both time points.

Although higher STSS scores could have been anticipated at T2 because of the exponential rise of confirmed cases (e.g., A. E. Kalaitzaki, Tsouvelas, Tamiolaki, & Konstantakopoulos, 2022), this was not the case in this study; the HCWs (both medical and nonmedical) reported significantly lower scores at T2 than those reported at T1. This may reflect an increased ability to adjust and manage COVID-19-related stress (e.g., fear of contagion and spreading of the virus). Limitation of resource losses and enhancement of resource gains (VPTG could be a resource gain) at a later stage of the pandemic may have resulted in reduced stress (Hollifield et al., 2016). Yu et al. (2023) suggested that the lessening of resource losses might have accounted for reduced depression levels in the later phases of the pandemic. Moreover, increased knowledge about COVID-19 and of using personal protection measures (A. E. Kalaitzaki et al., 2020), which may comprise "proximal defenses" to prevent conscious death fear (Pyszczynski et al., 2021) or resource gains (Hobfoll, 1989), may have mitigated initial fears and uncertainty. In contrast to expectations, both medical and nonmedical HCW's STSS scores decreased from T1 to T2, and this was conceptualized as an adaptation effect.

Whereas no interaction effect was found between time point and professional group on STSS scores, this effect was significant for VPTG. At T1, medical HCWs had lower VPTG scores compared to nonmedical HCWs, but at T2, medical HCWs' PTGI scores rose significantly, whereas the scores of nonmedical HCWs significantly decreased. This aligns with the assumption that adjustment to the requirements of the pandemic occurred. Constantly facing the COVID-19 pandemic and the increased numbers of potential/confirmed cases may have been a challenge to increasing PTGI scores. Although in a general population study of the same two time points, posttraumatic growth scores did not significantly increase at T2; there was a trend toward this (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022).

Consistent with a previous study (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022), intrusion was the only STSS symptom that predicted PTGI scores. According to researchers (Cui et al., 2021; Tedeschi & Calhoun, 2004), the cognitive processing or reprocessing of a stressful experience, such as the current pandemic, plays a key role in helping HCWs derive secondary benefits from their work, such as VPTG. Recent studies have shown that reducing the invasion of unwanted thoughts and increasing intentional rumination may result in positive changes (Cui et al., 2021; Shigemoto, 2022; Zeng et al., 2021). Two items of the STS intrusion subscale (No. 10. I thought about my work with clients when I didn't intend to and No. 13. I had disturbing dreams about my work with clients) clearly reflect unintentional thinking of the event, whereas the rest of the items may well be considered intentional/purposeful rumination, though undoubtedly cause stress (No. 2. My heart started pounding when I thought about my work with clients; No. 3. It seemed as if I was reliving the trauma(s) experienced by my client(s); No. 6. Reminders of my work with clients upset me). After all, addressing the impact of traumatic events—and not avoiding elaboration—is the aim of all trauma-focused therapies (Eichfeld et al., 2019). Future studies should examine the connection between the quality of intrusions and VPTG and better clarify the potential role of intrusions in the VPTG process.

Although findings from the first lockdown (A. Kalaitzaki & Rovithis, 2021; A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022; Ogińska-Bulik & Zadworna-Cieślak, 2018) have shown both adaptive and maladaptive coping strategies to predict VPTG, in this study, only adaptive coping strategies positively predicted VPTG. This finding is in line with a study in the general population in Greece (A. Kalaitzaki, Tsouvelas, & Tamiolaki, 2022) during the same two time points; it seems that during the second lockdown, the stressor is perceived as less uncontrollable and/or HCWs have been adjusted to the "lockdown experience" (Main et al., 2011). Finding internal (e.g., positive reframing) and external (e.g., instrumental support) resources to cope with and turning to religion are in line with the COR (Hobfoll, 1989, Hobfoll et al., 2016) which suggests that people try to safeguard resources to protect themselves and cope with the challenges of life and also invest resources to avoid further resource loss. For that reason, coping strategies were successful ways to cope with the demands of the pandemic and thus facilitated VPTG.

Unsurprisingly, positive reframing, instrumental support, active coping, and religious coping have already been found to predict PTGI scores in a general population sample during the first and second lockdowns (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022), as was found in this study too. Previous findings demonstrate that positive reframing is about trying to view things in a more positive way and is a type of benefit finding (Martin et al., 2021). It could help people modify maladaptive beliefs and cognitive distortions that develop after a stressful event and ascribe a constructive meaning to adversity (Hamama & Sharon, 2012). Furthermore, studies have shown that HCWs who took actions to solve their problems (active coping) and sought help (instrumental support) felt more capable of dealing with their life crises (Munroe et al., 2022; Ogińska-Bulik & Zadworna-Cieślak, 2018). Unsurprisingly, instrumental support, also communicating an emotional meaning (e.g., interest, care, and empathy; Semmer et al., 2008), was important during the lockdowns. Social support seems to provide the necessary resources for one to cope with stress and trauma and their negative psychological consequences. Through religious coping, people connect with God (Martin et al., 2021), give meaning to threatening events, find a sense of control and comfort, foster social relations through the religious community, and conceptualize suffering as a route to developing strength (Ogińska-Bulik & Zadworna-Cieślak, 2018). Reinforcing religious beliefs actually constitutes "distal defenses" in the presence of unconscious thoughts and reminders of death, which carry out a symbolic meaning of immortality (Menzies & Menzies, 2020).

On the other hand, substance use (using alcohol or drugs) as a way to cope with COVID-19 hardships was negatively related to PTGI scores. This is in agreement with prior studies (e.g., Okoli et al., 2021) that have shown that HCWs who used substances to a greater extent reported fewer positive changes. Interestingly, denial was a positive predictor of PTGI scores. This is in line with a previous study (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022; A. Kalaitzaki, Tsouvelas, & Tamiolaki, 2022) that found denial to predict two subscales of PTGI (personal strength and appreciation of life). To refute any allegations that denial may in fact favor the development of what has been called "illusory" rather than real or constructive

VPTG, we could argue that denial potentially inhibits unpleasant thoughts and thus reduces distress. Vagni et al. (2020) have found that coping strategies that stop unpleasant emotions and thoughts reduce the effect of stress on STS. Drawing on the terror management theory, it could be assumed that people use "proximal defenses," thus making any efforts (e.g., deny, suppress, minimize vulnerability) to remove from their conscious attention whatever is perceived as a mortality reminder, such as COVID-19 (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022; Pyszczynski et al., 2021), thus reducing extreme levels of distress, which in turn facilitate VPTG (Kelly et al., 2018). Whether these coping strategies constitute a necessary pathway to VPTG was further explored in this study with a mediation model.

Coping strategies that positively correlated with PTGI scores (positive reframing, instrumental support, active coping, religious, and denial) were considered useful and effective in promoting VPTG and were named "effective COVID-19-related coping strategies." Indeed, these effective strategies fully mediated the intrusion–VPTG relationship. Although intrusion initially predicted PTGI scores, this effect was no longer significant with the introduction of the "effective COVID-19-related coping strategies"; VPTG was facilitated through the indirect effect of those strategies. This finding aligns with Tedeschi and Calhoun's theory (2004), which suggests that coping responses are mediators between pain/trauma and growth and highlights the importance of coping strategies in promoting VPTG. Prekazi et al. (2021) have also highlighted the importance of a person's attempts to cope with trauma in predicting PTG and not the direct effect of trauma on PTG. "Effective COVID-19-related coping strategies" could be considered a collection of both cognitions (positive reframing, religion, and denial) and actions (instrumental support, active coping). Therefore, it was found that VPTG is the outcome of the positive effect of intrusive thoughts—both intentional and unintentional rumination (as measured with the STSS Intrusion subscale)—mediated by a compilation of growth-directed cognitions and growth-directed actions. Transforming cognitions into action is an indication of real positive adaptation and growth, as Hobfoll et al. (2007) have suggested. Although intrusive thoughts (either intentional or unintentional) facilitate the processing of a traumatic experience, coping strategies in the form of both cognitive processing/reframing and self-activation/support seeking further help HCWs achieve VPTG.

In keeping with other studies (Jeon et al., 2017; A. Kalaitzaki, 2021), female gender was a predictor of higher PTGI scores. Women are more likely to assign a negative meaning to their adverse experiences (Tedeschi & Calhoun, 2004), are more vulnerable to stress (Batra et al., 2020), and tend to ruminate more frequently than men (Henson et al., 2021). Stress and rumination have been found to promote growth (A. Kalaitzaki, Tamiolaki, & Tsouvelas, 2022; A. Kalaitzaki, Tsouvelas, & Tamiolaki, 2022). In line with the Greek population-based study, low educational level was associated with higher PTGI scores. Studies have been inconsistent in demonstrating that either more or less educated people (Henson et al., 2021) achieve growth. It is possible that less educated medical HCWs, such as nurses, may assume jobs and responsibilities that require closer contact with patients than those with higher education. It could also be assumed that the less educated may resort to other resources to cope with stress. Future studies should examine this assumption.

The hypothesis that resilience would be a predictor of VPTG was not confirmed; it was not a predictor of PTG in the Greek population-based study (A. Kalaitzaki, Tsouvelas, & Tamiolaki, 2022). Resilience has been associated with a lower risk of mental disorders (Munk et al., 2020) but not with higher PTGI scores. It might be that a resilient HCW is less motivated than a traumatized one to struggle with adversities to the same extent; thus, they do not necessarily deconstruct the COVID-19-related cognitive schemas and are less likely to achieve growth. Besides, resilience may act as a buffer, protecting against the adverse effects of traumatic or threatening experiences rather than offering opportunities for VPTG and encouraging/facilitating growth (Ogińska-Bulik & Zadworna-Cieślak, 2018).

A number of limitations should be acknowledged. The most important one is that this study was a repeated cross-sectional survey. Although a few participants were recruited twice, we believe that the assessments of these few participants at two time points (i.e., in quite different circumstances) could be considered distinct without confounding the results. Assessments were analyzed separately at each time point, and we included all assessments together only in the regression analysis and the structural equation model. Future longitudinal studies should be conducted to examine the evolution of the same participants across the two consecutive lockdowns and examine causal relationships between the variables. The convenience sampling method may have decreased the representativeness of the sample, as overwhelmingly more women than men have been recruited. Although large, the sample size was not well balanced between medical and nonmedical HCWs. The online and self-report format of the questionnaire may have resulted in associated biases (e.g., selection bias and social desirability). Although internal consistency was low for the subscales of the brief Cope (0.50–0.60), this was the case in many studies (Carver, 1997; Kapsou et al., 2010; Snell et al., 2011). Since the second lockdown was the point at which VPTG started to develop and given that the COVID-19 pandemic continues to surge, data on more time points are needed to provide a clearer picture of the process of VPTG and its contributing factors. The auxiliary staff/medical assistants could have been included in this study, as they are often considered the "behind-the-scenes healthcare heroes" and compared with the medical HCWs who are on the frontline of the pandemic.

In conclusion, the study findings showed that medical HCWs, who experienced higher levels of STS during the first lockdown compared to nonmedical ones, were also most likely to benefit from vicarious traumatic exposure by experiencing higher levels of VPTG during the second lockdown. Though nonmedical HCWs had lower STS levels than medical HCWs at both time points, they benefited less in terms of VPTG in the long run. Indeed, time was a significant predictor of VPTG; females, the less educated, those with intrusive STS symptoms, and those who were using mostly adaptive coping strategies also benefited most. Finally, intrusion, through what we call "effective COVID-19-related coping strategies" (i.e., positive reframing, instrumental support, active coping, religious, and denial), exerted a positive effect on VPTG.

In general, the findings of this study add support to the COR theory in the context of the pandemic (Hobfoll et al., 2015) and point the way to interventions aiming to diminish COVID-19-related resource losses to prevent adverse mental health consequences and enhance resource gains to augment positive outcomes. Therefore, interventions, such as psychoeducational programs, workshops, education/training, and individualized psychological support, should focus on teaching HCWs to identify harmful stressors and reinforce their skills to deal with them; teaching coping strategies that lead to higher PTGI scores seem to be fundamental. HCWs could further benefit from

harnessing and reframing the COVID-19-related stress experiences into growth opportunities by using denial positively and turning intrusive thoughts into what Huecker et al. (2021) have called a "deliberate, reflective form of thinking" to make meaning out of the adversities and form a positive mindset. Overall, the findings of the present study highlight the mental health needs of HCWs and could potentially pave the way for innovative interventions that should be the epicenter of both research and policy during this crisis.

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Received June 22, 2022
Revision received October 23, 2023
Accepted October 29, 2023 ■