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Original Article

Mediating Role of Coping Strategies and Defense Mechanisms in Relationship of Mental Health, Resilience, and Perceived Social Support with Posttraumatic Growth in COVID-19 Survivors

Elnaz Deldadeh Mehraban[1], Abdolhassan Farhangi[2*], Shahnam Abolghasemi[1]

[1]Department of Psychology, Tonekabon Branch, Islamic Azad University, Tonekabon, Iran
[2]Department of Psychology, Nort Tehran Branch, Islamic Azad University, Tehran, Iran

Abstract

Background & Aims: Posttraumatic growth (PTG) refers to positive changes resulting from trauma. As a traumatic stressor, COVID-19 can affect various aspects of one's life. The present study aimed to investigate the mediating role of coping strategies and defense mechanisms in the relationship of PTG and mental health, resilience, and perceived social support in COVID-19 survivors.

Materials and Methods: This study was conducted using a path analysis method from the correlation matrix. The research population included all COVID-19 recovered patients in Golestan province, Iran. Using the convenience sampling method, 300 patients who recovered from COVID-19 were selected. The participants were given questionnaires online. The research instruments included the Posttraumatic Growth Inventory (PTGI), the General Health Questionnaire (GHQ-28), the Multidimensional Scale of Perceived Social Support (MSPSS), Connor-Davidson Resilience Scale (CD-RISC), the Defense Style Questionnaire (DSQ), and the Ways of Coping Questionnaire (WOC). The data were analyzed through structural equation modeling (SEM) using SPSS and AMOS version 25.

Results: The findings of SEM revealed that the model fits the data. The relationship between problem-focused coping strategies and PTG, mental health, and perceived social support, the relationship between PTG and perceived social support, resilience, and mental health, and the relationship between mature defense mechanisms and PTG, mental health, resilience, and perceived social support were positive and significant ($P<0.01$). The relationship between emotion-focused strategies and PTG, resilience, and perceived social support, the relationship between neurotic defense mechanisms and mental health, resilience, PTG, and perceived social support, and the relationship between immature defense mechanisms and mental health, resilience, and PTG were negative and significant ($P<0.01$). Furthermore, the direct path analysis revealed that the relationships between mental health and emotion-focused strategies and between perceived social support and immature defense mechanisms were not significant.

Conclusion: The study results suggested that mental health, resilience, perceived social support, as well as problem-focused coping strategies played a crucial role in increasing PTG in COVID-19 patients. Therefore, they can be utilized to reduce the mental damage caused by the COVID-19 pandemic.

Keywords: Posttraumatic growth, Psychological support, Social support, Acclimatization, Resilience, Defense mechanisms, COVID-19

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1. Introduction

An outbreak of a viral disease was reported in Wuhan, China, in December 2019 [1]. This disease is caused by a novel type of genetically mutated virus from the Coronavirus family, also known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was named COVID-19 [2,3]. Due to its fast transmission rate, this virus spread rapidly throughout the world and infected the entire world in almost no time. The main symptoms of this disease include acute respiratory problems with a mortality rate of 2%. Taking into account the outbreak and transmission rate of this disease, on February 4, 2020, the World Health Organization (WHO) declared this outbreak a public health emergency and recommended that countries minimize the person-to-person transmission of this disease by reducing people's contact with each other, particularly special people such as the infected people and health care workers and control the global outbreak of this disease [4,5].

The pandemic state of COVID-19 has affected almost all economic and social aspects of life around the world; therefore, the psychological effects of this viral disease on the mental health of individuals in different social aspects are enormously crucial [6,7]. Tedeschi and Calhoun [8] proposed posttraumatic growth (PTG) as one of the important concepts in this regard. Jones et al [9] demonstrated that PTG can serve as an important factor in the improvement of the psychological and

*Corresponding Author: Abdolhassan Farhangi, Email: abdolhassanfarhangi@yahoo.com

even physical state of patients. In this situation, it is crucial to find strategies to cope with stress to increase psychological well-being and reduce posttraumatic stress [10]. Individuals employ a variety of coping strategies when they face stressful situations. Effective coping strategies can diminish the effects of stressors and prevent the short-term and long-term side effects of stress [11]. Coping is referred to the cognitive and behavioral efforts to manage the internal and external demands in stressful situations [12]. Coping strategies are divided into two basic types: adaptive and maladaptive. Adaptive coping strategies are generally based on problem-solving. They aim at changing, reducing, and eliminating stressors. However, maladaptive coping strategies, which are emotion-focused, include stress management through self-focus and the reduction of unpleasant emotions and feelings [13]. Kim et al [14] revealed that social support is one of the factors that have a positive and significant relationship with PTG. In their study on students during the COVID-19 pandemic, Cao et al [15] demonstrated that 24% of students have experienced anxiety. Among them, 9% reported symptoms of severe anxiety and the rest reported mild symptoms.

Defense mechanisms are among other psychological characteristics related to the COVID-19 disease [16]. Defense mechanisms refer to the subconscious and unintentional cognitive processes that protect individuals against anxiety, risk perception, or stressors. Such mechanisms have three levels (i.e., developed, neurotic, and immature). A mature defense mechanism is an adaptive, normal, and efficient coping strategy, whereas immature and neurotic defense mechanisms include maladaptive and inefficient coping strategies [17].

One of the important factors to be considered in COVID-19 survivors is their mental health [18,19]. Mental health is defined as a behavior in coordination and harmony with society, the cognition, and acceptance of social realities, as well as the ability to adjust to and meet the well-balanced needs of self [20]. In addition, it is an important factor affecting the general health of individuals in a society [21]. Herrera et al [22] argued that patients with chronic diseases do not have desirable mental health, and their lower mental health is predictive of high perceived stress, low self-efficacy, low life expectancy, acute physical symptoms, depression, high anxiety, and poor social performance.

Resilience is one of the indices influencing the improvement of psychological characteristics [23]. Resilience is defined as the ability to deal with problems and transform them into opportunities to grow [24]. It is also an invaluable framework to interact with others and challenging situations in life. Resilience is one of the protective factors that play a vital role in one's success and survival during harsh situations. Accordingly, this characteristic enables the individual to develop adaptive behaviors, face problems easily, and effectively deal with obstacles they face on the path to success [25].

Perceived social support is one of the effective factors in reducing the negative psychological effects of COVID-19 [26]. Perceived social support includes one's perception of the love and support one receives from family, friends, and relatives when facing mental pressures and accidents [27]. Perceived social support plays a crucial role in alleviating the negative psychological effects of diseases. Moreover, it is associated with less distress, a sense of greater control, reduction of the effects of negative events on life, and improvement of self-esteem and quality of life [28]. Therefore, based on the above-mentioned considerations, the present study aimed to investigate the mediating role of coping strategies and defense mechanisms in the relationship of mental health, resilience, and perceived social support with PTG in COVID-19 survivors in 2021.

2. Materials and Methods

This descriptive correlational study was performed employing path analysis. The research population included all COVID-19 recovered patients in Golestan province, Iran. Using the convenience sampling method, 300 patients who recovered from COVID-19 were selected. Online research questionnaires were designed, uploaded to a credible website, and distributed to participants. Inclusion criteria were as follows: history of COVID-19, conscious agreement to participate in the research, age range of 20 to 60 years, absence of mental problems, and non-use of psychiatric medications. The exclusion criterion included failure to respond to questions. Ethical considerations were observed in this study by obtaining informed written consent. Participants were also offered the option to withdraw from the study. After consulting with the research unit and getting the necessary permissions, sampling was carried out. The researcher analyzed the data.

2.1. Research instruments

2.1.1. Posttraumatic Growth Inventory (PTGI)

Tedeschi and Calhoun developed the PTGI in 1996 to examine the beneficial outcomes reported by individuals with a history of trauma. There are 21 questions in this questionnaire. The questionnaire is graded on a 6-point Likert scale, with scores of 0 (not at all), 1 (very low), 2 (low), 3 (medium), 4 (high), and 5 (very high). Tedeschi and Calhoun [29] found an internal consistency of 0.90 for this questionnaire. Heidarzadeh et al [30] reported a reliability of 0.81 for this questionnaire based on Cronbach's alpha coefficient. In this study, Cronbach's alpha coefficient was 0.84 for the questionnaire.

2.1.2. Connor-Davidson Resilience Scale (CD-RISC)

This study employed the CD-RISC [31] to measure resilience. This scale contains 25 items, which measure

resilience based on the 5-point Likert scale, i.e., ranging from zero (totally disagree) to 4 (totally agree). The reliability of the Connor-Davidson Resilience Scale was estimated to be 0.89 [32], and Cronbach's alpha coefficient was determined to be 0.85 for the scale in the present study.

2.1.3. General Health Questionnaire (GHQ-28)

Goldberg and Hiller designed the GHQ-28 in 1979 [33]. This questionnaire has 28 items. Participants rate each item on a four-point scale (strongly disagree to strongly agree). The questions are rated on a scale of 1 to 4, with the higher the score, the better the person's mental health [33]. The reliability of the GHQ was estimated to be 0.91 [34], and Cronbach's alpha coefficient was determined to be 0.87 for the questionnaire in the present study.

2.1.4. Multidimensional Scale of Perceived Social Support (MSPSS)

Zimet et al [35] developed the MSPSS, which gives a subjective evaluation of social support adequacy. The scale consists of 12 questions that evaluate the participant's opinion of social well-being in family, friends, and other important people using a 5-point Likert scale ranging from completely disagree (1) to completely agree (5). Higher scores imply higher levels of perceived social support. The reliability of this tool was reported to be 0.89 [36]. In the present study, Cronbach's alpha coefficient was 0.85 for the scale.

2.1.5. Defense Style Questionnaire (DSQ)

The DSQ was developed by Andrews et al. It contains 40 questions, in which 20 defense mechanisms are evaluated at three levels (i.e., developed, neurotic, and immature). It is scored based on the Likert scale, ranging from 1 to 9 [37]. Jafari et al [38] reported a reliability of 0.79 for this questionnaire based on Cronbach's alpha coefficient. In this study, Cronbach's alpha coefficient was 0.83 for the questionnaire.

2.1.6. The Ways of Coping Questionnaire (WOC)

In 1988, Lazarus and Folkman designed this questionnaire, which consists of 66 questions that evaluate the two primary subscales of problem-based and emotion-based coping. This questionnaire is graded on a 5-point Likert scale (1 to 5). The higher the score in each coping style, the more often that style is used by participants, and vice versa. Internal consistency ranged from 0.66 to 0.79 for each of the coping strategies, according to Lazarus. Salmanian and Marashian [39] reported a reliability of 0.87 for this questionnaire based on Cronbach's alpha coefficient. In this study, Cronbach's alpha coefficient was 0.82 for the questionnaire.

2.2. Statistical Analysis

The data was analyzed through structural equation modeling (SEM) using SPSS and AMOS version 25. All statistical analyses were performed at the 0.05 level of significance.

3. Results

Findings related to demographic variables revealed that 22.33% of the participants were under 25 years old, 37.33% were 25 to 35 years old, 27.33% were 35 to 45 years old, and 13.01% were over 45 years old. Furthermore, 52.67% of the participants were male, while 47.33% were female. Additionally, 49% had a high school diploma, and 51% had a university degree. Descriptive statistics, including mean and standard deviation (SD), and correlation coefficients between the study variables are presented in Table 1. The original suggested model to describe the relationship between the variables is shown in Figure 1.

The kurtosis and skewness of all the variables fell in the -2 to +2 range; therefore, the normal distribution of the data was confirmed. All the variables had variance inflation factor (VIF) < 10 and tolerance statistics > 0.1; therefore, the assumption indicating non- multi-linearity was confirmed.

The results in Table 2 demonstrate that the initial model has to be modified based on the root-mean-square error (RMSEA = 0.223). To correct the model, the insignificant relationships between mental health and emotion-focused coping, and between perceived social support and immature defense mechanisms were removed. There was a root-mean-square error (RMSEA = 0.017) in the final model, indicating that the model fits well. Figure 2 shows the final modified model.

Table 3 shows the results of estimating path coefficients

Table 1. Mean (SD) and Pearson correlation coefficients of the research variables

Variables	Mean ± SD	Skewness	Kurtosis	1	2	3	4	5	6
1- Mental health	62.16 ± 21.14	0.83	0.71	1					
2- Perceived social support	29.17 ± 8.12	0.91	0.62	0.49**	1				
3- Coping strategies	121.43 ± 45.17	0.36	-0.55	-0.31**	0.45**	1			
4- Defense mechanisms	52.81 ± 17.34	0.23	-0.35	0.39**	0.52**	0.28**	1		
5- Posttraumatic growth	44.65 ± 12.33	-0.34	-0.51	0.43**	0.29**	0.57**	0.33**	1	
6- Resilience	49.22 ± 15.26	-0.16	-0.16	0.37**	0.41**	0.36**	0.51**	0.45**	1

** $P < 0.01$.

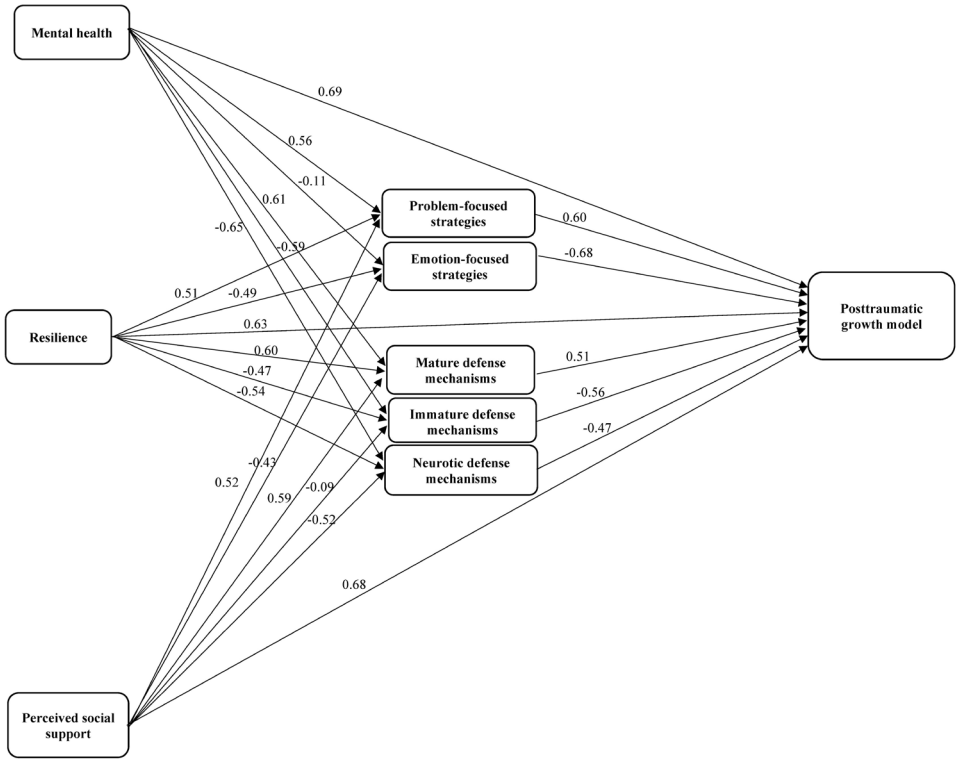

Figure 1. The initial model of the study.

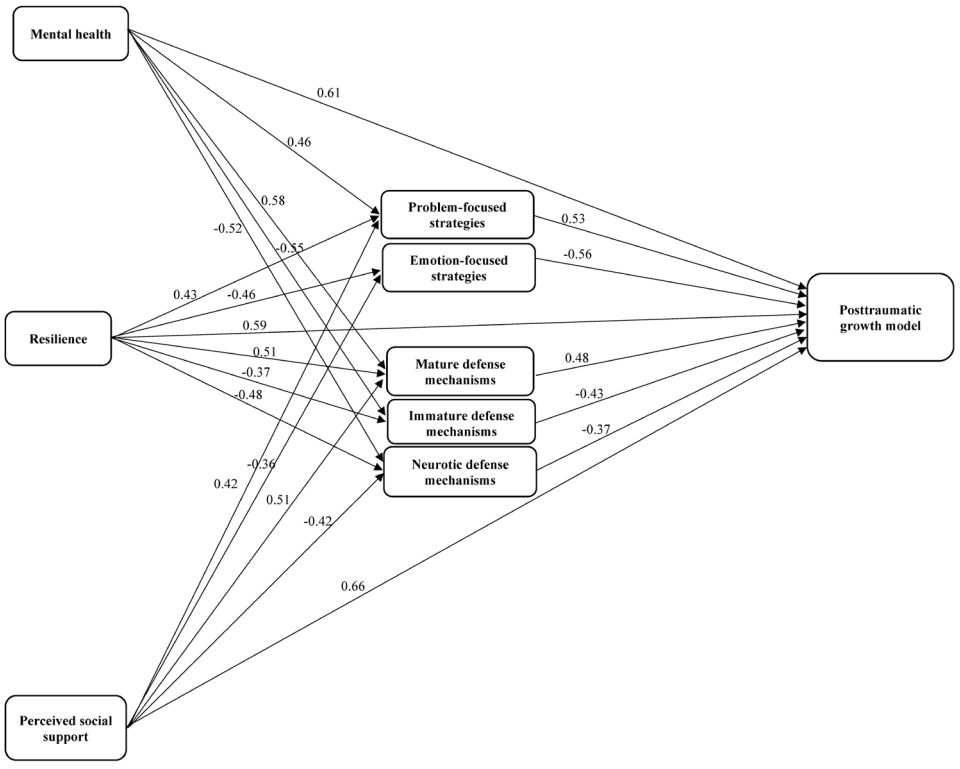

Figure 2. The Final Modified Model of the Study.

for testing direct hypotheses. The results showed that there was a direct relationship between problem-focused coping strategies and PTG (β = 0.43; *P* = 0.010), mental health (β = 0.46; *P* = 0.009), and perceived social support (β = 0.42; *P* = 0.011), between PTG and perceived social support (β = 0.66; *P* = 0.004), resilience (β = 0.59; *P* = 0.004), and mental health (β = 0.51; *P* = 0.001), and between mature defense mechanisms and PTG (β = 0. 48;

Table 2. Fit indicators of the initial and final models

Fit indicators	χ^2	df	(χ^2/df)	IFI	TLI	CFI	NFI	RMSEA
Initial model	2.15	1	2.15	0.57	0.62	0.67	0.54	0.223
Final model	5.36	2	2.68	0.92	0.94	0.92	0.91	0.017

Note: IFI, incremental fit index; RMSEA, root mean square error of approximation; CFI, comparative fit index; NFI, normed fit index; TLI, Tucker Lewis index .

Table 3. Direct relationship between research variables in the initial and final modified models

Path	Initial model		Final modified model	
Mental health to problem-focused coping	0.56	0.001	0.46	0.009
Mental health to emotion-focused coping	-0.11	0.136	-	-
Mental health to mature defense mechanisms	0.61	0.002	0.58	0.011
Mental health to immature defense mechanisms	-0.59	0.001	-0.55	0.001
Mental health to neurotic defense mechanisms	-065	0.013	-0.52	0.022
Mental health to PTG	0.69	0.001	0.61	0.001
Resilience to problem-focused coping	0.51	0.009	0.43	0.010
Resilience to emotion-focused coping	-0.49	0.008	-0.46	0.007
Resilience to mature defense mechanisms	0.50	0.001	0.51	0.001
Resilience to immature defense mechanisms	-0.47	0.001	-0.37	0.001
Resilience to neurotic defense mechanisms	-0.54	0.001	-0.48	0.001
Resilience to PTG	0.63	0.001	0.59	0.004
Perceived social support to problem-focused coping	0.52	0.002	0.42	0.011
Perceived social support to emotion-focused coping	-0.43	0.003	-0.36	0.012
Perceived social support to mature defense mechanisms	0.59	0.011	0.51	0.027
Perceived social support to immature defense mechanisms	-0.09	0.128	-	-
Perceived social support to neurotic defense mechanisms	-0.52	0.001	-0.42	0.001
Perceived social support to PTG	0.68	0.002	0.66	0.004
Problem-focused coping to PTG	0.60	0.004	0.53	0.013
Emotion-focused coping to PTG	-0.68	0.001	-0.56	0.001
Mature defense mechanisms to PTG	0.51	0.006	0.48	0.005
Immature defense mechanisms to PTG	-0.56	0.014	-0.43	0.023
Neurotic defense mechanisms to PTG	-0.47	0.001	-0.37	0.001

PTG: posttraumatic growth.

$P=0.005$), mental health ($\beta=0.58$; $P=0.011$), resilience ($\beta=0.51$; $P=0.001$), and perceived social support ($\beta=0.51$; $P=0.027$) in COVID-19 recovered patients. There was a negative relationship between emotion-focused strategies and PTG ($\beta=-0.56$; $P=0.001$), resilience ($\beta=-0.46$; $P=0.007$), and perceived social support ($\beta=-0.36$; $P=0.012$), between neurotic defense mechanisms and mental health ($\beta=-0.52$; $P=0.022$), resilience ($\beta=-0.48$; $P=0.001$), PTG ($\beta=-0.37$; $P=0.001$), and perceived social support ($\beta=-0.42$; $P=0.001$), and between immature defense mechanisms and mental health ($\beta=-0.55$; $P=0.001$), resilience ($\beta=-0.37$; $P=0.001$), and PTG ($\beta=-0.43$; $P=0.023$) in COVID-19 recovered patients. There was no significant relationship between mental health and emotion-focused strategies and between perceived social support and immature defense mechanisms in the recovered patients (Table 3).

The bootstrapping method was used to evaluate the significance of intermediary relationships. Table 4 summarizes these findings. The results showed that there was a significant indirect path from mental health, resilience, and perceived social support to PTG through the mediating role of problem-focused coping, mature defense mechanisms, and neurotic defense mechanisms in the COVID-19 survivors ($P<0.01$). There was a significant indirect path from resilience and perceived social support to PTG through the mediating role of emotion-focused coping ($P<0.01$). Moreover, there was a significant indirect path from resilience and mental health to PTG through the mediating role of immature defense mechanisms in COVID-19 survivors ($P<0.01$) (Table 4).

4. Discussion

The present study aimed to investigate the mediating role of coping strategies and defense mechanisms in the relationship of mental health, resilience, and perceived social support with PTG in recovered patients in Golestan province in 2021. The results showed there was a direct

Table 4. Results of Analysis of Indirect and Intermediary Paths in the Proposed Model

Predictor variable	Mediator variable	Criterion variable	Proposed model		Final modified model	
			β	*P*	β	*P*
Mental health	Problem-focused coping	PTG	0.129	0.001	0.133	0.001
Resilience	Problem-focused coping	PTG	0.132	0.001	0.144	0.001
Perceived social support	Problem-focused coping	PTG	0.126	0.001	0.139	0.001
Mental health	Emotion-focused coping	PTG	0.113	0.216	-	-
Resilience	Emotion-focused coping	PTG	0.127	0.006	0.138	0.006
Perceived social support	Emotion-focused coping	PTG	0.131	0.001	0.149	0.001
Mental health	Mature defense mechanisms	PTG	0.134	0.001	0.151	0.001
Resilience	Mature defense mechanisms	PTG	0.126	0.001	0.133	0.001
Perceived social support	Mature defense mechanisms	PTG	0.127	0.001	0.136	0.001
Mental health	Immature defense mechanisms	PTG	0.129	0.004	0.137	0.004
Resilience	Immature defense mechanisms	PTG	0.121	0.001	0.137	0.001
Perceived social support	Immature defense mechanisms	PTG	0.097	0.331	-	-
Mental health	Neurotic defense mechanisms	PTG	0.131	0.001	0.142	0.001
Resilience	Neurotic defense mechanisms	PTG	0.138	0.001	0.144	0.001
Perceived social support	Neurotic defense mechanisms	PTG	0.126	0.012	0.137	0.012

relationship between problem-focused coping strategies and PTG, mental health, and perceived social support, between PTG and perceived social support, resilience, and mental health, and between mature defense mechanisms and PTG, mental health, resilience, and perceived social support in COVID-19 recovered patients. There was a negative relationship between emotion-focused strategies and PTG, resilience, and perceived social support, between neurotic defense mechanisms and mental health, resilience, PTG, and perceived social support, and between immature defense mechanisms and mental health, resilience, and PTG in COVID-19 recovered patients. There was no significant relationship between mental health and emotion-focused strategies and between perceived social support and immature defense mechanisms in the recovered patients. Moreover, the results showed that there was a significant indirect path from mental health, resilience, and perceived social support to PTG through the mediating role of problem-focused coping, mature defense mechanisms, and neurotic defense mechanisms. There was a significant indirect path from resilience and perceived social support to PTG through the mediating role of emotion-focused coping. Moreover, there was a significant indirect path from resilience and mental health to PTG through the mediating role of immature defense mechanisms in the COVID-19 survivors. This finding is consistent with the results of previous studies [40-42].

When patients experience PTG, COVID-19 not only does not lead to a sense of despair and hopelessness but also becomes a turning point in their lives and enables them to encounter new situations and experiences. Therefore, it improves their mental perception of life situations and, consequently, their mental health [41]. Resilience is one of the crucial factors in experiencing and managing malignant comorbidities in COVID-19 survivors. Accordingly, COVID-19 survivors who reported resilience, effectively participated in the treatment since they were more prepared to accept the natural course of the disease. Patients with higher levels of resilience reported higher PTG [42].

Perceived social support is signified as the personal perception regarding access to support, sufficient assessment of support, and the quality of support when required. It is referred to the idea that the afflicted person has influential individuals who can potentially provide them with assistance during distress and hopelessness. On the other hand, perceived social support is often prospective and indicates predicting help when necessary [27]. The mental aspect of social support provides effective psychological help for patients to enable them to cope with pressures and problems in life.

In cases where COVID-19 survivors consider stress controllable, they employ problem-focused coping. Otherwise, they use emotion-focused coping. It might explain why problem-focused coping is mostly used for dealing with stressors related to work, social interactions, and performance, whereas emotion-focused coping is employed more for managing stressors related to health, well-being, and moods (anxiety and depression). However, several factors might cause the insignificance of the relationship between mental health and emotion-focused coping strategies [12]. For instance, if this study was conducted at a different time and location, the relationship between mental health and emotion-focused coping strategies might be significant. Furthermore, the constituents of mental health and emotion-focused coping strategies might not be similar, or they might have

emerged from two philosophically and culturally different contexts and backgrounds.

Coping is a multidimensional and self-regulating construct indicating the behavioral and cognitive mechanisms used to manage the internal and external demands in stressful situations. Emotion-focused coping styles include all regulative efforts to diminish emotional consequences of stressful events. However, problem-focused styles include all active efforts to manage stressful situations. Failure to employ emotion-focused coping strategies increases resilience. COVID-19 survivors who receive good social support are willing to employ more problem-focused styles and fewer avoidant ones. Patients who use problem-focused coping styles feel more control over stressful situations. In addition, it can be stated that patients who used emotion-focused coping styles faced more problems during stressful situations. Consequently, it resulted in lower PTG in these patients [13]. Therefore, when individuals use the developed defense mechanisms to face stressful situations, they experience less anxiety than individuals who use immature defense mechanisms. Moreover, they enjoy higher levels of general health [40]. Defense mechanisms are associated with mental and physical outcomes. When individuals use the developed defense mechanisms to deal with negative events, they experience less anxiety and higher resilience than those who use immature defense mechanisms [16]. COVID-19 survivors who enjoy higher social support mainly employ developed defense mechanisms and rarely resort to immature or neurotic defense mechanisms. Defense mechanisms serve individuals in this regard and protect them from excessive internal and external anxiety. This type of mental force can be helpful in the short run.

There were several limitations to this study. First, it was only conducted on recovered COVID-19 patients in Golestan Province; therefore, generalizing the findings to other statistical populations should be done with caution. Second, the study results were based on scales or questionnaires, which are prone to distortion due to conclusions based on unconscious responses.

5. Conclusion

Following the results, the proposed model achieved a good fit. The findings may be utilized to improve mental and physical patterns among COVID-19 patients. Given the significance of the post-traumatic growth pattern in COVID-19 patients, this study may lead to future research. In this sense, it may help investigations on stress-related difficulties and behavioral disorders (e.g., anxiety and depression), and its findings may pave the way for psychological interventions. It is also recommended that plans be established to improve the post-traumatic growth associated with the pandemic.

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Authors' Contribution

Conceptualization: Elnaz Deldadeh Mehraban, Abdolhassan Farhangi.
Methodology: Elnaz Deldadeh Mehraban, Shahnam Abolghasemi.
Validation: Abdolhassan Farhangi.
Formal Analysis: Shahnam Abolghasemi.
Investigation: Elnaz Deldadeh Mehraban, Abdolhassan Farhangi.
Resources: Elnaz Deldadeh Mehraban, Abdolhassan Farhangi.
Data Curation: Shahnam Abolghasemi.
Writing—Original Draft Preparation: Elnaz Deldadeh Mehraban.
Writing—Review and Editing: Elnaz Deldadeh Mehraban, Abdolhassan Farhangi.
Visualization: Abdolhassan Farhangi.
Supervision: Abdolhassan Farhangi, Shahnam Abolghasemi.
Project Administration: Abdolhassan Farhangi.
Funding Acquisition: Elnaz Deldadeh Mehraban.

Competing Interests

All the authors declare that they have no conflict of interest.

Ethical Approval

The present study was approved by the Ethics Committee of Islamic Azad University- Tonekabon Branch (code: IR.IAU.TON.REC.1400.033).

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