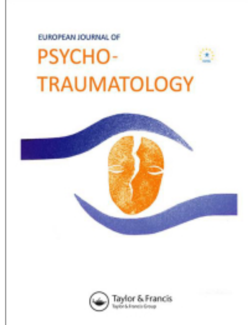

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BASIC RESEARCH ARTICLE

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Pathway linking attachment styles to post-traumatic growth among recovered COVID-19 patients: testing the mediating role of coping styles

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ABSTRACT

Background: Research on post-disaster mental health shows that people have unique resources to undergo positive changes like posttraumatic growth (PTG) after facing adversities.
Objective: This study aimed to investigate the relationship between attachment styles and PTG in COVID-19 survivors, with a focus on exploring the mediating role of coping strategies. Through examining these dynamics, the study seeks to contribute to deeper understanding of the psychological processes underlying growth in individuals recovering from the pandemic.
Method: A total of 210 participants were enrolled from the hospitals in Tabriz, Iran, in January 2021, and completed self-report questionnaires. PTG, attachment styles, and coping strategies were assessed using Posttraumatic Growth Inventory (PTGI), Revised Adult Attachment Scale (RAAS), and Coping Inventory for Stressful Situations (CISS). Structural equation modelling (SEM) was used to assess the mediation models.
Results: The direct effects of secure ($\beta = 0.22$, $p < .001$), and ambivalent-anxious attachment ($\beta = -0.22$, $p < .001$) on PTG were significant. Also, task-oriented coping significantly predicted PTG ($\beta = .60$, $p < .001$). The direct path from secure ($\beta = 0.16$, $p < .05$) and ambivalent-anxious attachment ($\beta = -0.38$, $p < .001$) to task-oriented coping was significant, as was direct impact of secure ($\beta = -0.18$, $p < .01$) and ambivalent-anxious attachment ($\beta = 0.37$, $p < .001$) to emotion-oriented coping. The association between secure attachment and PTG is significantly mediated by task-oriented coping ($\beta = 0.1$, (95% CI: 0.01–0.18)). Also, task-oriented coping was a significant negative mediator between ambivalent-anxious attachment and PTG ($\beta = -0.24$, (95% CI: −0.33 − −0.15)).
Conclusions: Results support the mediating role of coping strategies in the relationship between attachment styles and PTG. It emphasizes the importance of interventions for improving coping resources in individuals with life-threatening illnesses, focusing on improving problem-focused coping and reducing maladaptive strategies.

Ruta que vincula los estilos de apego con el crecimiento postraumático en pacientes recuperados de COVID-19: probando el papel mediador de los estilos de afrontamiento

Antecedentes: La investigación en salud mental después de un desastre muestra que las personas tienen recursos únicos para experimentar cambios positivos como el crecimiento postraumático (CPT) después de enfrentarse a adversidades.
Objetivo: Este estudio tiene como objetivo investigar la relación entre los estilos de apego y el CPT en los sobrevivientes de COVID-19, centrándose en explorar el papel mediador de las estrategias de afrontamiento. A través del examen de estas dinámicas, el estudio pretende contribuir a una comprensión más profunda de los procesos psicológicos subyacentes al crecimiento en individuos que se recuperan de la pandemia.
Método: Un total de 210 participantes se inscribieron en los hospitales de Tabriz, Irán, en enero de 2021, y completaron cuestionarios de autoinforme. El CPT, los estilos de apego y las estrategias de afrontamiento se evaluaron mediante el Inventario de Crecimiento Postraumático (PTGI en su sigla en inglés), la Escala Revisada de Apego Adulto (RAAS en su sigla en inglés) y el Inventario de Afrontamiento de Situaciones Estresantes (CISS en su sigla en inglés). Se utilizó un modelo de ecuaciones estructurales (SEM en su sigla en inglés) para evaluar los modelos de mediación.
Resultados: Los efectos directos del apego seguro ($\beta = 0.22$, $p < .001$), y ansioso-ambivalente ($\beta = -0.22$, $p < .001$) sobre el CPT fueron significativos. Asimismo, el afrontamiento orientado a la tarea predijo significativamente el CPT ($\beta = 0.60$, $p < .001$). La vía directa del apego seguro ($\beta = 0.16$, $p < .05$) y ansioso-ambivalente ($\beta = -0.38$, $p < .001$) sobre el afrontamiento orientado a la tarea fue significativa, al igual que el impacto directo del apego seguro ($\beta = -0.18$, $p < .01$) y ansioso-ambivalente ($\beta = 0.37$, $p < .001$) sobre el afrontamiento orientado a la emoción. La

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HIGHLIGHTS

- Individuals with secure attachment styles demonstrate significant positive posttraumatic growth following COVID-19 recovery.
- Problem focused coping plays a significant mediating role in the relationship between secure attachment style and posttraumatic growth in people who recovered from COVID-19.
- The findings suggest the importance of developing interventions to enhance coping resources for traumatized populations to facilitate posttraumatic growth.

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asociación entre el apego seguro y el CPT está significativamente mediada por el afrontamiento orientado a la tarea (β = 0.1, (IC 95%: 0.01–0.18)). Asimismo, el afrontamiento orientado a la tarea fue un mediador negativo significativo entre el apego ansioso-ambivalente y el CPT (β = −0.24, (IC 95%: −0.33 – −0.15)).
Conclusiones: Los resultados apoyan el papel mediador de las estrategias de afrontamiento en la relación entre los estilos de apego y el CPT. Se enfatiza la importancia de las intervenciones para mejorar los recursos de afrontamiento en individuos con enfermedades potencialmente mortales, centrándose en mejorar el afrontamiento centrado en el problema y reducir las estrategias maladaptativas.

1. Introduction

The novel COVID-19 infection has presented a pervasive health emergency for years (Guan et al., 2020). Since the beginning of the pandemic in early 2020, over 697 million diagnosed cases and 6 million deaths were confirmed globally (WHO, 2021). The main clinical manifestation of the virus was diffuse alveolar damage which was characterized by a mild to severe range of symptoms affecting the respiratory system such as cough, fever, pneumonia, and acute respiratory failure (Huang et al., 2020). Given the fluctuating and continuous nature of the covid-19 outbreak and its potential for direct and indirect impact on human beings, it posed a major traumatic event for people (Northfield & Johnston, 2021). Growing evidence revealed such negative psychological outcomes and exacerbated mental health concerns during the covid-19 pandemic, such as subclinical and clinical levels of depression, anxiety, and posttraumatic stress symptoms among different populations (Hossain et al., 2020; Vita et al., 2023). Specifically, individuals infected with the virus have faced significant challenges and threats to their life and mental well-being both during the course of the disease and after recovery (Lebeaut et al., 2023). Extensive studies on patients with COVID-19 have highlighted the psychopathological symptoms (Zhang et al., 2020).

Post-disaster mental health literature indicates that individuals may have unique resources to develop the ability to experience some salutogenic aspects such as positive transformation and posttraumatic growth (PTG) in the aftermath of adversities (Tedeschi & Calhoun, 2004b). As a concept proposed by Tedeschi & Calhoun (1996), PTG refers to the development of significant positive and meaningful changes which result from struggling with traumatic life circumstances. According to the 'shattered assumptions theory' (Janoff-Bulman, 1992, 2010), exposure to trauma through shattering the belief system of individuals, leads to cognitive imbalance. Taking into account the necessity for cognitive reconstruction and reframing, individuals establish the alternative perspectives as a 'new normal' which includes positive posttraumatic views of self-perception, life philosophy, and interpersonal relationships, and this cognitive process is conceptualized as PTG (Tedeschi & Calhoun, 1996, 2004a).

The predominant framework for understanding growth after trauma revolves around five key domains: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. 'Relating to others' refers to the development of closer relationships and a heightened appreciation for family and friends. 'New possibilities' entail perceiving opportunities for change, such as pursuing education, career shifts, or embarking on new paths. Some individuals recognize their 'personal strength,' realizing they are more resilient or capable than previously believed. For others, growth manifests as a deepened spiritual belief. Lastly, many report a newfound 'appreciation of life,' leading to reevaluation of life's priorities (Tedeschi & Calhoun, 1996).PTG has been a point of interest in healthcare domains over recent years. Studies have demonstrated that PTG can manifest in individuals who have faced life-threatening health conditions, such as cancer (Zhai et al., 2019), HIV infection (Ye et al., 2018), chronic pain (Ayache et al., 2021), and epidemics like Severe Acute Respiratory Syndrome (SARS) (Cheng et al., 2006). Various psychological factors can facilitate PTG in people (Tedeschi & Calhoun, 2004a). Among them, the quality of interpersonal relationships regarding the parent-to-child attachment during childhood can influence the way in which a person evaluates a traumatic event and its sequelae (Chris Fraley, 2002). Attachment is an emotional bond that connects one individual to another (Bowlby, 1969). The quality of the attachment relationship between a primary caregiver and an infant shapes the internal working models of self and others. Ainsworth (1979) categorizes attachment styles into three main types: secure, insecure-anxious ambivalent, and insecure-avoidant. Adults with secure attachment styles are comfortable with intimacy and can easily depend on others while also being able to maintain independence. They do not fear abandonment or being alone. In contrast, individuals with anxious attachment styles tend to worry about rejection and are preoccupied with their relationships, often feeling insecure about their connections with others. Avoidant adults are uneasy with closeness and intimacy, often distrusting others

and avoiding emotional closeness in relationships (Hazan & Shaver, 1987). Attachment theory proposes that early experiences with attachment figures provide a base for internal representations of relationships that influence various life domains (Bowlby, 1982). Thereby, it contributes a beneficial framework to learning about individual differences in the ways they regulate emotions and cope with trauma (Mikulincer & Shaver, 2010). There is a significant positive relationship between secure attachment and PTG among various traumatized populations (Gleeson et al., 2021). Securely attached individuals usually appraise people as responsive and predictable, and count on their protection and relief when needed, which leads to more functional emotion regulation and makes it easier to adapt to adverse events (Wu & Yang, 2012). Conversely, an anxiously/ambivalent attached individual is suffered from rejection and unavailability of a significant other which lead to forming a negative self-concept (Bartholomew & Horowitz, 1991), and can suppress the experience of the unique domains of growth, such as an appraisal of personal strength (Gleeson et al., 2021). They utilize hyper-activating strategies to manage intense emotions and seek support (Ein-Dor et al., 2010a, 2010b). Given the inhibition of self-regulation, it is improbable that a significant relationship with PTG exists, as investigations have shown (Romeo et al., 2019). Furthermore, given that evidence has supported the negative (Levi-Belz & Lev-Ari, 2018) or non-significant relationship (Dekel et al., 2011) between avoidant attachment and development of PTG, it is worth noting that an avoidant attachment style lays the foundation for mistrust, which is usually resolved using deactivating emotion regulation mechanisms to dismiss threat-related cues and avoid distress (Arikan et al., 2016).

Coping is another important concept found to be associated with PTG (Schmidt et al., 2019), and refers to a cognitive or behavioural effort to manage a situation perceived as stressful (Folkman et al., 1986). Coping styles can be classified into problem-focused, which involves addressing the underlying issues and trying to resolve the problem; emotion-focused, which includes releasing emotions, disengaging emotionally from stressors, and seeking emotional support; and avoidant, which involves social withdrawal and maladaptive avoidance of the traumatic situation (Finstad et al., 2021). Problem-focused coping has been found to be a key factor relating to PTG (Karanci & Erkam, 2007), whereas emotion-focused and avoidance coping have been usually related to poor psychological consequences (Tuncay & Musabak, 2015). There is substantial evidence that coping mediates pathways to facilitate PTG in diseases (Bellur et al., 2018). Given such mediating role, coping also may influence the pathways of attachment-specific emotion regulation and response to trauma (Folkman & Moskowitz, 2004), in which active coping styles (i.e. problem-focused) are more likely to mediate the relationship of secure attachment with PTG (Schmidt et al., 2012). Regarding the alternative pathways connecting attachment to the experience of PTG, coping styles can play a significant role, but research findings have been inconsistent (Gleeson et al., 2021).

PTG is influenced by factors such as secure attachment and coping styles. According to the existing literature, securely attached individuals tend to experience more PTG, while coping strategies, particularly problem-focused coping, play a mediating role in the relationship between attachment and PTG. Understanding these psychological dynamics is crucial for addressing the mental health challenges posed by the pandemic. In light of these pieces of evidence, the current investigations are mainly focused on the negative psychological impact of the covid-19 pandemic. Studies on PTG also focused on the healthy population (Zeng et al., 2021). Hence, it is necessary to investigate the positive and adaptive aspects of the novel pandemic in the population of recovered patients and explore the mechanisms and pathways through which the attachment system relates to PTG. To this end, we aimed to clarify the three following research questions. First, we conducted an assessment of the model fit with empirical data, ensuring that the theoretical framework aligns well with the observed relationships among attachment styles, coping strategies, and PTG in recovered COVID-19 patients. This step was crucial in establishing the validity of our research design and confirming that our hypothesized relationships were supported by the data collected. Second, we investigated the direct effect of attachment styles on PTG among recovered COVID-19 patients. This analysis aimed to determine the extent to which attachment styles, specifically secure, ambivalent-anxious, and avoidant styles, directly influence the experience of PTG, independent of other variables such as coping strategies. Third, we assessed the mediating effect of coping styles on the associations between attachment styles and PTG in recovered COVID-19 patients. This analysis aimed to understand the extent to which coping strategies, such as problem-focused, emotion-focused, and avoidant coping, act as intermediaries in the relationship between attachment styles and PTG, shedding light on the underlying mechanisms of psychological adjustment following trauma. We hypothesized that secure attachment style would be positively associated with PTG, while ambivalent-anxious and avoidant attachment styles would be negatively associated with PTG. Additionally, we hypothesized that problem-focused coping would positively mediate the relationship between secure attachment style and PTG, while emotion-focused and avoidant coping

would negatively mediate the relationship of ambivalent-anxious and avoidant attachment styles with PTG. As far as we know, there is a research gap in this field and this is the first study that has examined the mediating role of coping styles in the structural relationship between attachment styles with PTG in patients recovered from COVID-19.

2. Methods

2.1. Participants and procedures

The current study was a cross-sectional survey study focused on individuals who had survived COVID-19. From this population, a study sample of 430 volunteers were recruited. The eligibility criteria comprised individuals who met the following conditions: (a) having a confirmed clinical diagnosis of COVID-19, (b) undergoing standard COVID-19 interventions, (c) not having a history of significant psychiatric or neurological illnesses, (d) falling within the age range of 18–65 years, and (e) having at least an elementary school level of education. Following the acquisition of the necessary approvals, data on recuperated patients, including their contact information, were obtained from a number of hospitals in Tabriz, Iran. Because of the ongoing pandemic situation and the specific patient group under investigation, ensuring the participants' safety and well-being was a priority. Consequently, data collection was conducted online to minimize face-to-face interactions and adhere to social distancing guidelines. The data collection process took place from January through March 2021, with an average time elapsed since recovery from COVID-19 of 2 months. An initial screening process was carried out to ensure data quality and minimize potential outliers, resulting in the deletion of 220 participants. The reduction in participants was driven by several factors. Initially, we excluded 62 participants who did not fully complete the study questionnaires and did not adhere to the study's guidelines. Also, a data cleaning process was undertaken to validate responses and identify any inconsistencies or discrepancies, resulting in deletion of 42 participants. Subsequently, an outlier analysis was conducted to identify responses that deviated from the norm. The determination of outliers was based on statistical criteria, such as extreme scores or patterns of responses that were inconsistent with the majority of participants and aimed at identifying responses that fell outside of the expected range in a significant and anomalous manner, using techniques such as interquartile range (IQR) in box plots and Mahalanobis distance. Univariate outliers were identified and removed using box plot analysis. This method visually displays the distribution of data and highlights any values that fall significantly outside the interquartile range. This approach led to the identification of 54 participants with univariate outliers. In addition, multivariate outliers were identified and removed using the Mahalanobis distance method. The Mahalanobis distance measures the correlations between variables to detect outliers in a multivariate context. A significance threshold of $p < .001$ was applied, resulting in the identification of 43 participants as multivariate outliers. In total, 97 participants were identified as outliers and excluded from the analysis. 19 participants also voluntarily withdrew from the study for personal reasons. As a result, a final sample of 210 people remained for data analysis.

2.2. Ethical considerations

Ethical approval for this study was granted by the Research Ethics Committee of the University of Tabriz (Approval code: IR.TABRIZU.REC.1400.007). Prior to data collection, all participants received detailed information about the study's objectives, procedures, and potential risks. It was emphasized that participation in the study was entirely voluntary, and individuals had the right to withdraw from the study at any time without facing any negative consequences. Participants electronically provided their informed consent by clicking the 'agree to participate in the research' button, indicating their willingness to take part in the study. Throughout the research process, we were diligent in preserving participant confidentiality and ensuring data security. Additionally, all data were anonymized to protect the identities of the participants.

2.3. Measures

2.3.1. Posttraumatic growth inventory (PTGI)

The PTGI assesses the degree of positive transformation experienced following a traumatic event (Tedeschi & Calhoun, 1996). The inventory breaks down positive life changes into different areas including relationships with others, personal strength, new possibilities, appreciation of life, and religious/spiritual change. Participants rate these changes on a Six Point Likert scale from 0 to 5 (from 'not at all' to 'a very great degree'). The overall PTGI score was obtained by summing the ratings of all items, where higher scores signified greater levels of PTG. Previous research has shown that the PTGI total score and subscale scores are consistent and reliable (e.g. Morris et al., 2012). Within our dataset, the internal reliability of the PTGI proved satisfactory, with a Cronbach's α coefficient of 0.90 for the entire instrument and ranging from 0.50 to 0.80 for its subdomains We employed the Persian translation of the PTGI in our study.

2.3.2. Revised adult attachment scale (RAAS)

The RAAS, developed by Collins in 1996, builds upon the foundation established by the Adult Attachment Scale (AAS), initially conceptualized by Collins and Read in 1990. Its purpose is to assess individual differences in attachment styles. This 18-item scale is structured into three subscales, each consisting of 6 items rated on a 5-point Likert scale (1 = Not at all characteristic of me, 5 = Extremely characteristic of me) to generate a total score (18–90). 'Close Subscale' measures the level of comfort and ease an individual experiences in intimacy and emotional closeness. 'Depend Subscale' assesses the extent of an individual's trust and reliance on others, and 'Anxiety Subscale' measures the level of fear an individual has of abandonment as well as the fear of establishing connections with others. The revised scale was improved by replacing specific elements within its subscales. These changes involved improving reliability, addressing wording issues, and introducing new items that focus on ambivalence about relationships (Collins, 1996). The scale has demonstrated good reliability in Iran. For instance, in a study conducted by Mohammadi et al. (2016), the internal consistency of the scale was reported as 0.68 using Cronbach's alpha. Furthermore, in Pakdaman's (2004) study, the Cronbach's alpha coefficients were 0.52, 0.28, and 0.74 for the close, depend, and anxiety subscales, respectively. The internal consistency for the present study yielded a coefficient of 0.80. We utilized the Persian translation of this questionnaire.

2.3.3. Coping inventory for stressful situations (CISS)

The CISS (Endler & Parker, 1990) is a 48-item self-report inventory. Respondents are asked to score their involvement in various coping strategies when facing stressful situations on a 5-point Likert scale ranging from 1 (Not at all) to 5 (Very much). The CISS consists of three 16-item subscales that evaluate Emotion-oriented coping (Emotion scale), Task-oriented coping (Task scale), and Avoidance (Avoidance scale). The scores within each of the three subscales range from 16 to 80, with higher scores indicating a greater level of coping activities specific to that subscale. In an Iranian sample of respondents, Shokri et al. (2009) reported Cronbach's alpha coefficients of 0.84 for the Emotion scale, 0.86 for the Task scale, and 0.80 for the Avoidance scale, underscoring the strong reliability of the scale. For this research, we employed a Persian-translated version of the CISS for participants. Cronbach's alpha in the present study was acceptable (α = 0.86).

2.4. Data analyses

Data were analyzed using SPSS Version 20.0 and AMOS Version 24.0. Firstly, an initial outlier analysis was conducted to identify responses that deviated from the norm. This analysis, based on statistical criteria such as extreme scores or inconsistent response patterns, identified 97 participants as outliers, who were then excluded from the analysis. After that, the normality was assessed through the coefficients of skewness (Sk) and kurtosis (Ku). Based on the calculated values, all the variables displayed suitable conformity to a normal distribution, with the highest skewness value recorded at 0.60 and a kurtosis value of 1.10. Subsequently, the dataset underwent examination to identify multivariate outliers using Mahalanobis D2. No notable outliers were observed (df = 6, $\chi^2 <$ 22.46), and all variable distributions displayed characteristics consistent with normality. Descriptive statistics were obtained utilizing measures like percentages, means, and standard deviations (SD). Cronbach's alphas were computed to assess the scales' reliability. Also, we used the Pearson correlation analysis to investigate the direction and degree of relationships between the primary research variables.

We utilized structural equation modelling (SEM) to assess the proposed model, investigating how attachment styles influence PTG through coping styles. SEM was chosen for its ability to provide standardized regression coefficients and *p*-values for both direct and indirect effects. To evaluate the significance of the indirect effects, we used the bootstrapping method, a resampling technique (1000 resampling) with 95% confidence intervals (CI). In this method, if the upper and lower 95% confidence intervals do not encompass zero, the indirect effects are considered statistically significant (Preacher & Hayes, 2008). The parameters were estimated using the Maximum Likelihood Estimation method. Model goodness-of-fit was evaluated by employing four indices in accordance with the fit criteria suggested by Hu and Bentler (1999). The indices include the relative chi-square (χ2/df; values below 3.0 are typically seen as indicative of a good fit), the Root Mean Square Error of Approximation (RMSEA) and its 90% Confidence Interval (CI) (with values close to 0.06 indicating a good fit and values up to 0.08 indicating an acceptable fit), the Bentler-Bonett Normed Fit Index (NFI; with values of 0.90 or higher indicating an acceptable fit and values of 0.95 or higher indicating a good fit), and the Comparative Fit Index (CFI; with values of 0.90 or higher indicating an acceptable fit and values of 0.95 or higher indicating a good fit) (Kline, 2023).

3. Results

3.1. Descriptive statistics

Table 1 presents the results of descriptive statistics within the research sample. A total of 210 participants were recruited in the study. Among them 67 (31.9%)

Table 1. Descriptive statistics of sample demographics (N = 210).

Variables		N	(%)
Gender	Male	67	31.9
	Female	143	68.1
Marriage	Married	80	38.1
	Single	121	57.6
	Divorced/widow	9	4.3
Education	Elementary	6	2.9
	Diploma	46	21.9
	Undergraduate or Graduate	158	75.2
Socioeconomic status	High	10	4.8
	Low	21	10
	Middle	179	85.2
Job	Employed	98	46.7
	Unemployed	112	53.3
Treatment type	Outpatient treatment (Home quarantine)	195	92.9
	Inpatient care	15	7.1

were males and 143 (68.1%) were females. The mean age of the participants was 30.23 years (SD = 9.98, range = 18–65). Also, the most common marital status was single (N = 121, 57.6%), followed by married (N = 80, 38.1%), and divorced/widowed (N = 9, 4.3%). Regarding the type of treatment, 92.9% of participants received outpatient treatment and home quarantine, while a minority (7.1%) underwent inpatient care.

3.2. Bivariate correlations

Pearson correlations between the variables were calculated (Table 2). Significant negative associations were observed between secure attachment and emotion-oriented coping (r = −0.33, $p < .01$). Additionally, positive correlations were identified between secure attachment and task-oriented coping (r = 0.31, $p < .01$) as well as PTG (r = 0.49, $p < .01$). Also, there were significant negative correlations between avoidant attachment and emotion-oriented coping (r = −0.21, $p < .01$). Also, positive correlations have been calculated between avoidant attachment and task-oriented coping (r = 0.17, $p < .05$). Ambivalent-anxious attachment also exhibited negative correlations with task-oriented coping (r = −0.45, $p < .01$), avoidant coping (r = −0.16, $p < .05$) and PTG (r = −0.53, $p < .01$), while it displayed a positive correlation with emotion-oriented coping (r = 0.47, $p < .01$). Furthermore, task-oriented coping showed a significant correlation with PTG (r = 0.67, $p < .01$). Additionally, there were positive and negative correlations between PTG and avoidant coping (r = 0.28, $p < .01$) and emotion-oriented coping (r = −0.32, $p < .01$) respectively.

3.3. Assessment of the structural model

We conducted mediation model and path analyses to examine whether coping styles mediate the relationship between attachment styles and PTG in participants who recovered from covid19. This hypothesized model was tested using AMOS 25. Table 3 (supplemental data) displays the fit indices for the structural equation model. We assessed the fit indices for both the full mediation and the partial mediation models. the full mediation model exhibited an inadequate fit for the data, whereas the partial mediation model demonstrated an acceptable fit to the data, χ^2 /df = 2.52, NFI = 0.91; CFI = 0.94; RMSEA = 0.07. As shown in Figure 1, we assessed the direct pathways from attachment styles and coping styles to PTG in partial mediation model. There was a significant direct effect from secure attachment (β = 0.22, $p < .001$), anxious attachment (β = −0.22, $p < .001$), and task-oriented coping (β = 0.60, $p < .001$) to PTG. Also, the direct effect of secure attachment on task-oriented (β = 0.16, $p < .05$) and emotion-oriented coping (β = −0.18, $p < .01$) was statistically significant. Furthermore, there was a significant direct effect from ambivalent-anxious attachment to task-oriented (β = −0.38, $p < .001$), emotion-oriented (β = 0.37, $p < .001$), and avoidant coping (β = −0.16, $p < .05$). However, there were no significant direct effects between avoidant attachment and each of the three coping styles. Besides, the direct effect of avoidant attachment, emotion-oriented coping, and avoidant coping on PTG was not statistically significant. Finally, no significant direct effect was found between secure attachment and avoidant coping.

3.4. Tests of mediation effects

The bootstrapping procedure was utilized to further assess the significance of the indirect effects along with 95% confidence intervals (CI). The mediation results have revealed that the association between secure attachment and PTG was significantly

Table 2. Descriptive statistics and bivariate correlations of key variables (N = 210).

	M (SD)	Sk	Ku	Cronbach's Alpha	1	2	3	4	5	6	7
1. Secure Attachment	12.54 (2.52)	−.29	−.24	0.78	1						
2. Avoidant attachment	13.44 (2.21)	−.14	.17	0.69	0.10	1					
3. Ambivalent-anxious attachment	11.96 (5.53)	−.16	−.58	0.84	−0.38**	−0.31**	1				
4. Task-oriented coping	52.57 (10.41)	−.06	−.62	0.90	0.31**	0.17*	−0.45**	1			
5. Emotion-oriented coping	41.26 (10.44)	.30	−.56	0.89	−0.33**	−0.21**	0.47**	−0.27**	1		
6. Avoidant coping	40.99 (8.10)	−.02	−.62	0.77	0.11	−0.01	−0.16*	0.34**	0.14*	1	
7. PTG	64.90 (14.45)	−.21	−.63	0.90	0.49**	0.13	−0.53**	0.67**	−0.32**	0.28**	1

Note. *$p < .05$. **$p < .01$.

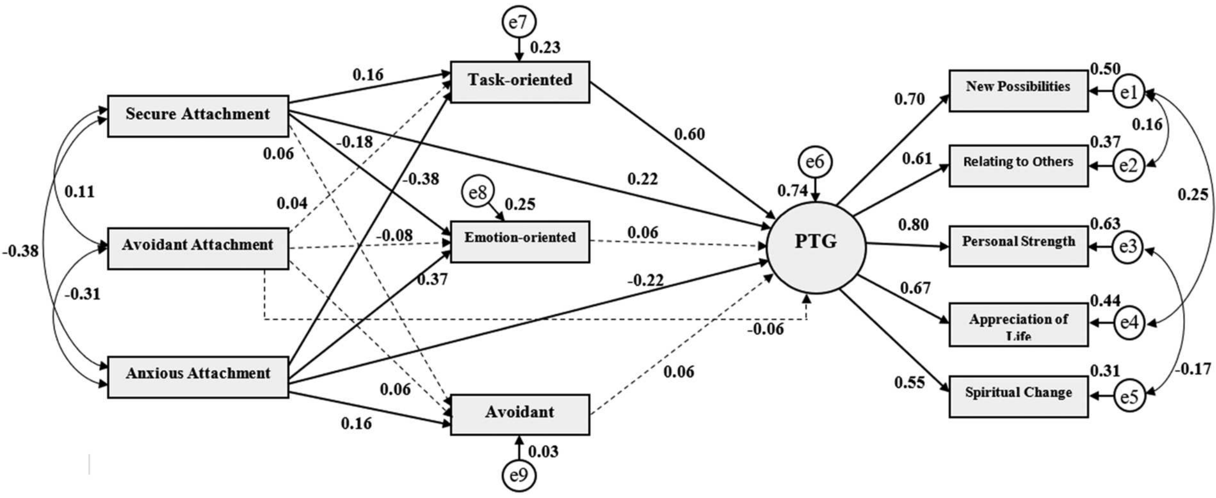

Figure 1. Structural equation model of PTG. Standardized coefficients are presented. Non-significant paths were shown with dotted lines. PTG = Posttraumatic growth, Anxious Attachment = Ambivalent-anxious attachment, Task-Oriented = Task-oriented coping, Emotion-Oriented = Emotion-oriented coping, Avoidant = Avoidant coping.

mediated by task-oriented coping (β = 0.10, (95% CI: 0.01–0.18)). Thus, secure attachment can predict a higher use of task-oriented coping strategies, and, in turn, higher use of task-oriented coping strategies associated with a higher level of PTG. Also, the results indicated that task-oriented coping was a significant negative mediator between ambivalent-anxious attachment and PTG (β = −0.24, (95% CI: −0.33 – −0.15)). This suggests that having an ambivalent-anxious attachment style may predict a reduced use of task-oriented coping. Subsequently, a reduced use of task-oriented coping strategies is linked to a lower level of PTG. The indirect effects in the remaining pathways were all equal to zero and not statistically significant (See Table 3, supplemental data, for significant and non-significant paths in the tested model).

4. Discussion

In the present study, we aimed to investigate the mediating role of coping strategies in the association between attachment styles and PTG among recovered COVID-19 patients. We addressed three main research questions related to attachment styles, coping strategies, and PTG among recovered COVID-19 patients. Firstly, we conducted an assessment and ensured that our theoretical framework aligns well with the observed relationships among attachment styles, coping strategies, and PTG, validating our research design. Secondly, we investigated the direct impact of attachment styles – secure, ambivalent-anxious, and avoidant – on PTG, aiming to understand their independent contributions to PTG experiences. Lastly, we explored the mediating role of coping strategies – problem-focused, emotion-focused, and avoidant – in the relationship between attachment styles and PTG, illuminating the underlying mechanisms of psychological adjustment following trauma. As we hypothesized, the results obtained from the path analysis showed a significant positive relationship between secure attachment style and PTG. This result is consistent with the prior studies (see, Gleeson et al., 2021). Salo et al. (2005) found that secure attachment was positively linked to PTG, especially in the aspects of personal strength, relating to others, and spiritual change. Attachment theory (Bowlby, 1980) provides insights into why individuals who survived COVID-19 have reacted differently to a novel traumatic situation, a newly life-threatening illness. We assumed that survivors' individual responses to trauma, shaped by their past experiences, play a role in influencing whether trauma facilitates the journey towards PTG or results in negative consequences. The experiences of securely attached individuals are integrated into their positive early cognitive frameworks regarding self-worth, the kindness of others, and the safety of the environment. This model of self and others become active when facing threats to one's safety and well-being, enabling them implement effective emotion regulation strategies (Hazan & Shaver, 1987). As Mikulincer et al. (2003, 2006) indicated, individuals with secure attachments display ease and comfort with interdependence and intimacy. They might be better at utilizing coping strategies like seeking social support when facing trauma, which may facilitate PTG (Levi-Belz & Lev-Ari, 2018). This may be due to their increased tendency to seek comfort from others and effectively utilize it during challenging experiences (Wu & Yang, 2012). Moreover, they can efficiently build new cognitive schemas and regulate their emotions, both crucial elements in PTG (Calhoun & Tedeschi, 1990).

Our findings also showed a significant negative association between ambivalent-anxious attachment and PTG, consistent with our hypothesis on this relationship Experiencing growth following trauma

indicates that, while stress and difficulties may occur, they can be effectively managed (Tedeschi et al., 2018). Hence, negative self-appraisal in anxious attached individuals (Bowlby, 1980) makes it difficult to perceive themselves as capable of handling and overcoming a traumatic event. Existing research indicates that individuals with anxious attachment report experiencing greater distress and difficulties compared to those with secure attachment (Berger, 2015; Mikulincer & Shaver, 2019). In particular, individuals with an anxious attachment style encompass poor self-regulatory skills (Ein-Dor et al., 2010) and try to gain support through the use of overactive and exaggerated emotional regulation strategies in order to cope with distress and a sense of incapacity, and this process make them vulnerable to distress and other negative posttraumatic outcomes (Mikulincer et al., 2006). Previous studies have obtained consistent results with our findings (Schuitmaker et al., 2023). Although a few studies (see, Graci & Fivush, 2017) reported a significant positive relationship between anxious attachment and post-traumatic growth, most studies concerning anxious attachment styles place greater emphasis on the distress experienced by these individuals when facing a traumatic event (Volgin & Bates, 2016).

Our another hypothesis suggested that avoidant attachment style would negatively predict PTG. However, despite the negative correlation between avoidant attachment and PTG, the association did not reach statistical significance. In line with the prior research, the results of the studies conducted by Schmidt et al. (2012, 2019) and Taqipour and Nayinian (2018) did not reveal a significant direct relationship between the avoidant attachment style and PTG. Graci and Fivush (2017) showed a significant negative correlation between avoidant attachment and PTG. Individuals with the avoidant attachment style tend to use ineffective and passive strategies. For example, they may deny their need for support or suppress the intensity of distress, frequently creating emotional distance from the circumstance (Marshall & Frazier, 2019). Rather than confronting the traumatic event, such individuals may downplay its significance by suppressing stress and diminishing any form of response, be it positive developments or symptoms of post-traumatic stress (PTS) (Arikan & Karanci, 2012). Alternatively, instead of facing adversity, they might engage in other activities. As a result, their reports of personal growth are less likely to align with those of individuals who are anxious, significant associations with PTG or distress are usually absent. In a review of studies on the association between attachment styles and PTG, Marshall and Frazier (2019) revealed that the majority of the studies conducted regarding the connection between avoidant attachment style and PTG yielded non-significant results.

Another finding supported by our analysis is the positive relationship between problem-focused coping and PTG. The results of prior studies also revealed consistent results (Bellur et al., 2018). Based on this, problem-focused coping appeared as a strong predictor of PTG in a traumatized population. According to Tedeschi and Calhoun (2004), the process of PTG is compared to earthquake reconstruction. An adverse life event challenges an individual's prior cognitions and provides an opportunity for restructuring and reorganizing cognitive patterns that can manage similar experiences in the future. If a person does not undergo this process and does not adapt their experience to update their prior beliefs about the world (e.g. they have always believed that unfortunate events sometimes happen), PTG won't occur (Tedeschi & Calhoun, 2004). Furthermore, if an individual approaches this new experience negatively, PTG is not expected to happen (e.g. bad things will happen, and there's nothing I can do to prevent them). Joseph and Linley (2005) argued that individuals who negatively interpret this experience are vulnerable to post-traumatic stress symptoms (PTS). Calhoun et al. (2010) have presented a comprehensive model of mechanisms facilitating PTG. Key mechanisms involve cognitive processing of the event, making it meaningful and creating new meanings for adverse life events. These are the key mechanisms that facilitate growth. Problem-focused coping, which includes mechanisms such as seeking more information about the problem, planning, cognitive analysis, and taking action to overcome specific obstacles, can be compared to cognitive processing and cognitive restructuring in Tedeschi and Calhoun's theory. It is clear that in this type of coping, life events are considered an opportunity for personal growth beyond the threatening situation, the cause and nature of the problem is identified, and responses are taken into action (Miller & Miller, 2000). According to Taylor's cognitive adaptation theory (1988), positive reinterpretation of stressful life events plays a crucial role in adaptation to stress and the experience of growth. If individuals acquire new assumptions and skills and attempt to reinterpret the event, they are more likely to have increased self-confidence and mastery over events, which increases the likelihood of experiencing stress-related growth.

On the other hand, the results of the present study did not demonstrate a significant relationship between emotion-focused and avoidant coping strategies with PTG. In light of what we know about the assimilation and accommodation of information in response to changing circumstances (in the organismic valuing model), emotion-focused coping can be seen as a form of accommodation that adapts both mental structures and external functions to match the changing conditions in order to achieve balance in the

environment. In this case, resistance to change and maintaining the structural and functional integrity of the organism will not lead to growth but instead result in sustained distress and stress related to the environment, ultimately leading to PTSD and associated emotional disorders (Joseph, 2009). Emotion-focused and avoidant coping strategies are employed when the situation has become impossible to solve for the individual. Therefore, not only is the situation not a challenge for the individual in terms of attempting to overcome it, but it also involves an attempt to distance oneself from the situation and replace negative emotions arising from the situation. Consequently, growth does not occur in this case. As Gil (2005) points out, individuals who obtain high scores in emotion-focused and avoidance coping strategies are at a significantly higher risk for stress symptoms and the stressful situation remains unresolved for these individuals. However, cultural context plays a significant role in shaping coping strategies, and the lack of significance in this case in our study could also be influenced by cultural factors. For example, in collectivist cultures like Iran (Asians in general), individuals may prioritize social support-seeking coping strategies over emotion-focused or avoidant coping strategies. Additionally, cultural beliefs about emotions may influence the way emotions are perceived and regulated. For instance, in cultures where emotional expression is encouraged, individuals may be more likely to use strategies such as seeking emotional support to cope with stressors. Conversely, in cultures where emotional restraint is valued, individuals may be more inclined to use strategies that involve suppressing or avoiding emotional experiences. Cultural norms regarding confrontation and avoidance also play a role, with some cultures encouraging direct confrontation of challenges (Kuo, 2011). Iran's culture, rich in traditions, influences coping, with religion, spirituality, and strong familial ties shaping coping strategies (Ahmadi et al., 2018). Understanding these cultural nuances is essential for interpreting the results and implications of our study.

The results of mediation analysis demonstrated that problem focused coping strategies play a significant positive mediating role in the relationship between secure attachment style and PTG. This finding is aligned with our hypothesis, which proposed that problem-focused coping would positively mediate the relationship between secure attachment style and PTG. The results of the studies conducted by Arikan and Karanci (2012), and Kanninen et al. (2002) are also consistent with our finding in this regard. Experiencing a life-threatening illness that exposes an individual to a wide range of emotional, social, and physical needs can be highly stressful. In such conditions, a secure attachment style assists in creating a psychological safe space within the individual, establishing close and friendly relationships with others, and expressing emotions to seek support and manage stress using active coping strategies. Bellizzi and Blank (2006) indicate that active coping strategies and problem-focused approaches, along with social support, act as predictors of post-traumatic growth.

Another finding of our study showed a negative mediating role of problem-focused coping in the relationship between ambivalent-anxious attachment and PTG. Individuals with anxious attachment style tend to use emotion-focused coping strategies when faced with stressors (Ognibene & Collins, 1998). According to a study conducted by Kanninen et al. (2002), individuals with anxious attachment style, continually ruminate on their distress cues, relying on overactive emotion regulation strategies that keep them alert and attentive to potential threats and exaggerating their distress to seek support. For example, Roberts et al. (1996) observed that the relationship between adult attachment styles and depression is primarily mediated by ineffective coping strategies, resulting in low self-esteem. It has also been shown that individuals with anxious attachment styles are more likely to engage in maladaptive coping strategies, such as bulimia nervosa, excessive alcohol consumption (Brennan & Shaver, 1995), and emotional eating (Pistole, 1995) in stressful situations. Therefore, such coping strategies can be considered as a mediator in how insecurely attached individuals deal with illness as a potentially traumatic event, and in such cases, PTG may not occur, or the impact of such coping may result in negative outcomes.

Other pathways linking attachment styles to PTG through coping strategies showed minimal indirect effects and did not attain statistical significance. Fuendeling (1998) concluded that although both avoidant and anxious attachment styles are associated with high levels of distress, it appears that each of them represents different and distinct self-regulatory strategies for managing distress. Anxious attachment individuals both attend to and express their distress, while those with avoidant attachment tend to suppress their distressing emotions. He tested and confirmed the following three hypotheses. First, anxious and avoidant attachment styles are significantly and distinctly associated with emotion-focused and avoidant coping strategies. Second, both anxious and avoidant attachment, as well as emotion-focused and avoidant coping, are significantly related to distress and stress-related symptoms. Finally, coping styles act as important predictors of current distress and can largely mediate the relationships between both insecure attachment styles (anxious and avoidant) and resulted distress. Based on these studies and our findings, it can be inferred that the mediation of coping strategies in insecure individuals does not lead to PTG and may

negatively influence the occurrence of PTG or have a neutral effect in insecure individuals.

The results of this study need to be assessed within the context of its limitations. First, the data were based on the self-report questionnaires, which may be vulnerable to self-reporting biases and social desirability. Next, given that the study is cross-sectional in nature, it has significant limitations in its ability to unveil causal effects. Furthermore, the findings of this study were derived from specific situations arising from the COVID-19 pandemic. Hence, caution is warranted when applying these findings to different stressful situations. Another limitation is that we did not conduct a power analysis prior to the research, which may have impacted the robustness and generalizability of our findings. We employed an online non-random sampling method to reach participants, restricting our sample exclusively to people living in Tabriz. Hence, our findings cannot be extended to individuals living in different regions.

Another limitation of our study is the absence of an investigation into the influence of other medical variables related to COVID-19 on our study variables, such as the severity of illness or duration of hospitalization. Also, we did not assess other psychological characteristics which could potentially influence PTG, such as personality traits (Mattson et al., 2018), self-compassion (Liu et al., 2023), or resilience (Han et al., 2023). Finally, cognitive indicators of PTG, such as rumination, event centrality, and perceived control, are important factors in the development of PTG, and they can significantly influence the outcomes, as demonstrated in both the theoretical model of PTG (Tedeschi & Calhoun, 2004) and the existing literature (Stockton et al., 2011). However, these predictors were not assessed in the current study.

5. Conclusion

This study investigated the pathway linking attachment styles to PTG via coping strategies in individuals who recovered from Covid19. Findings showed that problem-focused coping strategies have a crucial indirect effect on the relationship between attachment styles and PTG. Our study was the first to examine these variables within the sample of people infected by the virus. This model attempted to expand the theoretical framework that explains the direct and indirect pathways of PTG regarding the novel pandemic. The clinical applicability of this model can inspire counsellors and psychologists to create psychological interventions directed towards effectively managing the complexities of a public health emergency. Hence, it is essential to develop interventions to enhance coping resources for traumatized populations. These interventions should aim to enhance problem-focused coping strategies while reducing the reliance on maladaptive coping strategies among traumatized people with secure and insecure attachment styles. Furthermore, innovative coping strategies, such as neuroeducation or neuro didactics (Trenado et al., 2021), could assist patients in acquiring adaptive coping strategies to manage the heightened stress associated with multiple stressors (In this study, increased stress caused by the COVID-19 pandemic). Also, it is recommended for the future research to complement self-report instruments with interviews and other objective approaches to assess the perceived degree of recovery in survivors of life-threatening diseases. Lastly, longitudinal studies should also be taken into account for understanding the connections between relevant variables.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

We do not have plans to publicly share the data supporting the findings of this study. However, interested parties may request access to the data from the corresponding author.

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