An Actor-Partner Interdependence Model Analysis of the Effect of Meaning in Life on Posttraumatic Growth in Cancer Patients and Caregivers

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Abstract [**Objectives**] To analyze the effect of meaning in life on posttraumatic growth in cancer patients and their caregivers based on the Actor-Partner Interdependence Model (APIM). [**Methods**] A convenience sample of 273 cancer patient-caregiver pairs was recruited. They were investigated using a general information questionnaire, the Chinese version of the Meaning in Life Scale, and the Posttraumatic Growth Inventory (PTGI). An actor-partner interdependence model of meaning in life on posttraumatic growth was established. [**Results**] Patients' and caregivers' meaning in life ($r=0.292$) and posttraumatic growth ($r=0.513$) were positively correlated ($P<0.05$). In terms of actor effects, both patients' ($\beta=0.275$) and caregivers' ($\beta=0.247$) meaning in life positively predicted their own posttraumatic growth ($P<0.05$). For partner effects, patients' meaning in life positively predicted caregivers' posttraumatic growth ($\beta=0.191$, $P<0.05$), whereas caregivers' meaning in life did not significantly predict patients' posttraumatic growth ($P>0.05$). [**Conclusions**] Cancer patients' meaning in life can positively predict both their own and their caregivers' posttraumatic growth. This suggests that healthcare professionals should adopt a dyadic perspective when intervening with cancer patients and their caregivers, so as to improve posttraumatic growth in both parties.

Key words Cancer, Caregivers, Meaning in life, Posttraumatic growth, Actor-Partner Interdependence Model (APIM)

1 Introduction

According to the *World Cancer Report 2020*, an estimated 19.29 million new cancer cases occurred worldwide in 2020, and China reported 4.568 million new cases and 3.002 million deaths, the highest incidence and mortality rates globally[1]. The complexity and inherent uncertainty of cancer care take a heavy toll on the physical and psychological well-being of both patients and their caregivers. Posttraumatic growth (PTG) is conceptualized as the positive psychological change that emerges from the struggle with highly challenging life crises[2], while meaning in life refers to the process of making sense of one's existence and recognizing personal value[3]. Evidence has shown that both patients and caregivers can develop PTG throughout the cancer experience, which in turn may reduce anxiety and depression and enhance quality of life and meaning-making[4-5]. The Actor-Partner Interdependence Model (APIM), introduced by Kenny *et al.*[6] in 1999, posits that an individual's emotions and cognitions can influence the health outcomes of a partner within a dyadic relationship. However, most prior research has focused on individual-level effects, and studies addressing meaning in life and PTG from a dyadic, patient-caregiver perspective are still limited. To address this gap, the present study examines the mutual effects of meaning in life on PTG within patient-caregiver pairs, providing insights for dyad-based clinical interventions.

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2 Study subjects and methods

2.1 Study subjects A convenience sampling method was used to select cancer patients and their caregivers who were hospitalized in the Oncology Department of a tertiary grade - A hospital in Shiyan City from October 2024 to October 2025 as the study subjects.

2.1.1 Patients. Inclusion criteria: (i) histopathologically confirmed diagnosis of cancer, with at least 3 months since diagnosis; (ii) adequate comprehension and communication skills; (iii) informed about the study and willing to participate voluntarily. Exclusion criteria: (i) having recently experienced major traumatic events such as natural disasters, man-made disasters, or the loss of a loved one; (ii) having visual or hearing impairments, or mental illness; (iii) being unaware of their own cancer diagnosis.

2.1.2 Caregivers. Inclusion criteria for caregivers: (i) aged over 18 years, including parents, spouses, siblings, children, *etc.*; (ii) if multiple caregivers rotated in caring for the patient, priority was given to the caregiver who served as the legal guardian; (iii) caregiving duration of at least 30 d; (iv) adequate comprehension and communication skills; (v) informed about the study and participating voluntarily. Exclusion criteria: (i) having recently experienced major traumatic events such as bereavement, natural disasters, or man-made disasters; (ii) having visual or hearing impairments, or mental illness; (iii) being a paid or employed caregiver. This study was approved by the hospital ethics committee (approval number: LW-2024-007).

2.2 Methods

2.2.1 Survey tools. (i) General information questionnaire. This

questionnaire was self-designed by the researchers and covered items including gender, age, education level, marital status, and religious belief of both patients and caregivers.

(ii) Posttraumatic Growth Inventory (PTGI). The PTGI was originally developed by Tedeschi *et al.* [7] in 1996. The Chinese version, translated and revised by Wang Ji *et al.* [8], consists of 20 items across five domains: Relating to Others, New Possibilities, Personal Strength, Spiritual Change, and Appreciation of Life. Items are rated on a 6-point Likert scale from 0 (not at all) to 5 (very much). The Cronbach's α values for the subscales and the overall scale ranged between 0.611 and 0.874. The total score ranges from 0 to 100 points, with higher scores reflecting greater posttraumatic growth. In this study, the Cronbach's α for the scale was 0.761.

(iii) Chinese version of the Meaning in Life Questionnaire (C-MLQ). This study used the Chinese version translated and revised by Chinese scholar Liu Sisi *et al.* [9], which comprises two dimensions: Seeking Meaning in Life and Experience of Meaning in Life, with a total of 9 items. Responses are scored on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The total score ranges from 9 to 63 points, with higher scores indicating a higher level of perceived meaning in life. In this study, the Cronbach's α coefficient of the scale was 0.864.

2.2.2 Data collection methods. Data were gathered through an on-site questionnaire survey administered by the researcher and a trained graduate student. Prior to the survey, all participants received standardized instructions explaining the study purpose and completion requirements. For participants unable to self-administer the questionnaire, the investigator read the items aloud and recorded the responses. A total of 273 valid paired samples of patients and caregivers were collected.

2.2.3 Statistical methods. Statistical analyses were performed using SPSS 23.0 and Amos 24.0. Categorical variables were described by frequencies and percentages. Normally distributed continuous variables were expressed as mean ± standard deviation (*SD*). Paired *t*-tests were used to compare posttraumatic growth and meaning in life between cancer patients and their caregivers. Pearson correlation analysis was conducted to examine the associations between posttraumatic growth and meaning in life within the patient-caregiver pairs. The Actor-Partner Interdependence Model (APIM) was constructed to analyze the effects of patients' and caregivers' meaning in life on their posttraumatic growth. A two-tailed P value < 0.05 was considered statistically significant.

3 Results and analysis

3.1 General information of patients and caregivers In the study, there were 182 males and 91 females aged from 24 to 86 years. There were 127 males and 146 females aged from 22 to 85 years.

3.2 Comparison of meaning in life and posttraumatic growth scores between patients and caregivers Cancer patients scored significantly lower than their caregivers on both meaning in life and posttraumatic growth ($P < 0.001$). The results are shown in Table 1.

Table 1 Comparison of meaning in life and posttraumatic growth scores between patients and caregivers ($n = 273$, $\bar{x} \pm s$; points)

Subjects	Meaning in life	Posttraumatic growth
Cancer patients	40.62 ± 6.19	58.30 ± 12.53
caregivers	45.45 ± 6.40	62.31 ± 11.45
t	−10.658	−5.588
P	<0.001	<0.001

3.3 Correlations between meaning in life and posttraumatic growth in patients and caregivers Cancer patients' meaning in life was positively correlated with both their own posttraumatic growth and their caregivers' posttraumatic growth ($P < 0.05$). Similarly, caregivers' meaning in life was positively correlated with both their own posttraumatic growth and the cancer patients' posttraumatic growth ($P < 0.05$). as shown in Table 2.

Table 2 Correlation coefficient between meaning of life and posttraumatic growth in cancer patients and caregivers ($n = 273$)

Item	Caregivers' meaning of life	Caregivers' posttraumatic growth
Patients' meaning of life	0.292 *	0.263 *
Patients' posttraumatic growth	0.078 *	0.513 *

NOTE * denotes $P < 0.05$.

3.4 APIM analysis An APIM was constructed with cancer patients' and caregivers' meaning in life as predictor variables, and their posttraumatic growth as outcome variables. The results are shown in Fig. 1. Model parameters were estimated using the maximum likelihood method. The model was saturated, with both chi-square and degrees of freedom equal to zero. For actor effects, cancer patients' meaning in life positively predicted their own posttraumatic growth ($\beta = 0.275$, $P < 0.05$), and caregivers' meaning in life positively predicted their own posttraumatic growth ($\beta = 0.247$, $P < 0.05$). For partner effects, cancer patients' meaning in life positively predicted caregivers' posttraumatic growth ($\beta = 0.191$, $P < 0.05$), whereas caregivers' meaning in life did not significantly predict cancer patients' posttraumatic growth ($\beta = -0.003$, $P > 0.05$).

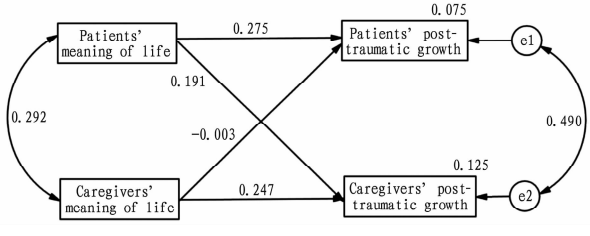

Fig. 1 Path diagram of the APIM of meaning in life and posttraumatic growth in cancer patients and their caregivers

4 Discussion

4.1 Meaning in life in both cancer patients and caregivers was at a moderate level, with patients scoring lower than caregivers The results revealed that patients reported lower meaning in life scores (40.62 ± 6.19) points than their caregivers (45.45 ± 6.40) points. Besides, patients scored lower on the Search for Meaning subscale than on the Experience of Meaning in Life subscale, a finding that aligns with Zhou Qiao *et al.* [10]. The challenges posed by physical symptoms, treatment side effects, and death anxiety may diminish patients' capacity to actively pursue meaning in life, resulting in a diminished sense of meaning. By contrast, caregivers often demonstrate enhanced psychological resilience and adaptation over the course of long-term caregiving[11]. Therefore, healthcare providers may consider implementing meaning-centered psychotherapy or acceptance and commitment therapy (ACT)[12] to assist patients in rediscovering their sense of purpose and value in life. It is also advisable to encourage family members to offer psychological support, thereby helping patients set meaningful goals and rebuild their confidence in life.

4.2 Posttraumatic growth was at a moderate level in both cancer patients and caregivers, with patients scoring lower The results showed posttraumatic growth scores of (58.30 ± 12.53) points for patients and (62.31 ± 11.45) points for caregivers. The lower scores in patients may be linked to their TNM stage and time since diagnosis. Brandao *et al.* [13] found that breast cancer patients had relatively high posttraumatic growth shortly after diagnosis, which remained stable six months after treatment. Tang *et al.* [14], however, reported lower posttraumatic growth among patients with advanced cancer, suggesting that posttraumatic growth can shift along the disease course and clinical condition[15]. Caregivers, in contrast, tend to accumulate posttraumatic growth more readily, as their psychological resilience, adaptation, and self-regulation are continuously strengthened through long-term caregiving. Drawing on the psychosocial adjustment model proposed by Joseph *et al.* [16], stress-coping training can facilitate psychological healing and growth. Such evidence underscores the need for healthcare professionals to implement psychological interventions for both patients and caregivers. One example is family dignity therapy[17], which employs qualitative interviews to uncover inner needs and stimulate intrinsic motivation, thus enhancing posttraumatic growth in both parties.

4.3 Positive correlations between meaning in life and posttraumatic growth in both patients and caregivers The results of this study revealed a positive correlation between meaning in life and posttraumatic growth in both cancer patients and their caregivers, a finding consistent with Loffler *et al.* [18]. Meaning in life serves as a crucial psychological anchor, helping individuals overcome mental barriers and reconstruct life perceptions and value priorities[19]. A stronger sense of meaning in life enables individuals to actively adjust cognitive beliefs and adapt to the challenges of illness, thereby promoting posttraumatic growth[20]. During the course of cancer diagnosis and treatment, patients and caregivers become more attuned to existential meaning, which facilitates positive growth. These findings suggest that healthcare professionals should guide patients to face the disease with greater acceptance, enhance benefit finding, and attend to caregivers' psychological needs through emotional support. Such approaches may improve care quality and patients' quality of life, ultimately fostering mutual enhancement of meaning in life and posttraumatic growth for both parties.

4.4 Actor-partner interdependence effects of meaning in life on posttraumatic growth The actor effects revealed that both cancer patients' and caregivers' meaning in life positively predicted their own posttraumatic growth, indicating that meaning in life facilitates posttraumatic growth. This finding aligns with the results of Gao Ran *et al.* [21]. Meaning in life contributes to maintaining physical and mental health and enhancing psychological resilience, thereby helping both patients and caregivers achieve positive growth from the trauma of illness[22]. Family support can influence an individual's sense of meaning in life[23-24]. As a core source of support, caregivers can enhance patients' meaning in life through psychological support, which in turn promotes their posttraumatic growth. These findings suggest that healthcare professionals should adopt dyadic intervention strategies: assisting patients in rebuilding life goals, while attending to caregivers' emotional well-being and affirming their efforts, so as to elevate posttraumatic growth in both parties.

The partner effects showed that patients' meaning in life positively predicted caregivers' posttraumatic growth, whereas caregivers' meaning in life did not significantly predict patients' posttraumatic growth. An enhanced sense of meaning in life among patients may concurrently foster positive growth in their caregivers. However, as the individuals directly experiencing the disease, patients exhibit more distinctive psychological distress and coping styles, particularly in domains such as death anxiety and spiritual coping, which differ from those of caregivers[25-26]. Their posttraumatic growth depends more on personal attitudes and is less susceptible to caregiver influence. These findings suggest that healthcare professionals should guide patients to develop an accurate understanding of their illness, strengthen the supportive role of caregivers, and assist patients in finding meaning in life through the traumatic experience.

By adopting the Actor-Partner Interdependence Model, this study addresses the limitations of single-perspective research from a dyadic viewpoint. It clarifies the interdependent and mutually influential relationship between patients and caregivers, providing a basis for enhancing their posttraumatic growth and promoting physical and mental health. Future intervention programs should be developed based on positive psychology and a dyadic relational perspective, guiding both patients and caregivers to face the ill-

ness with acceptance, discover benefits, and perceive the value of life, so as to foster posttraumatic growth through positive coping.

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