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Change in resilience among spousal caregivers of patients with newly-diagnosed advanced cancer over the first six months posttreatment in China

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ABSTRACT

Objective: A longitudinal observational study was conducted and aimed to examine the change in resilience among spousal caregivers of newly-diagnosed advanced cancer patients over the first six months after initial treatment.

Methods: In total, 312 Chinese spousal caregivers who were taking care of their patients with newly-diagnosed advanced cancer were recruited. The level of resilience was measured using the Connor–Davidson Resilience Scale at the first month post-initial treatment (T1), three-month post-initial treatment (T2), and six-month post-initial treatment (T3). Latent growth modeling analyses were performed to examine changes in resilience using Mplus 8.3.

Results: The mean scores of resilience in spousal caregivers were 54.01 ± 7.68 at T1, 56.20 ± 6.38 at T2, and 57.97 ± 6.70 at T3, respectively. Results of latent growth modeling indicated that spousal caregivers showed a significant increase in their resilience scores over the first six months post-treatment (Mean slope = 1.98, $p < 0.001$). Furthermore, a significant individual variation in the rate of changes in resilience scores allowed spouses to be categorized into two groups: 42.9% participants with fast growth and 57.1% participants with slight growth.

Conclusion: Our findings highlight the importance that new knowledge about change patterns of resilience in the nursing field is beneficial to reveal different psychosomatic health. Acknowledging that resilience is a dynamic process that changes over time, it is crucial for healthcare providers to monitor the psychological adjustment and focus of vulnerable caregivers, particularly spouses.

1. Introduction

Cancer has been a leading and increasing cause of death for many years [1]. In China, about 4.1 million new cancer cases and 2.4 million new cancer deaths occurred in terms of cancer statistics [2]. Being diagnosed with advanced cancer can be considered a potentially traumatic event for both patients and their families, because advanced cancer is unlikely to be cured or controlled with treatment [3,4]. Interestingly, caregivers have been shown to have higher prevalence rates in psychiatric disorders than advanced cancer patients, for example with panic disorder (8.0% and 4.2%, respectively) or post-traumatic stress disorder (PTSD; 4.0% and 2.4%, respectively) [5]. During the first six months of the patients undergoing anti-cancer therapies, the nature of caregivers' psychological adjustment has been shown to change substantially as the patients' condition evolves [6,7]. Hence, it is especially crucial to pay attention to caregivers' psychological health during the early phases of the illness trajectory.

For cancer patients, the primary caregivers are their spouses [8,9], who tend to exhibit significantly more symptoms of psychiatric disorders than caregivers with a different relationship to the patient [10]. In China, about 60% of family caregivers of cancer patients are their spouses [11,12]. When cancer patients are faced with the fear of death, or feelings of uncertainty and hopelessness, their spouses also experienced potential changes in their own emotional state, for example

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experiencing caregiving strain and bereavement [9]. Indeed, the trauma experienced by spouses of newly-diagnosed advanced cancer patients is particularly severe due to the life-threatening nature and the complex nature of cancer treatment. To overcome these risks and trauma and ensure the quality of care, most caregivers seem to maintain their mental and physical stability, and this process is described as resilience [13].

According to American Psychological Association, resilience refers to both the process and the outcome of successfully adapting to difficult or challenging life experiences [14]. There are three classifications of definition being viewed as a trait, a process, or an outcome in psychology [15]. Comparing the definitions proposed in three points of view, the definitions of resilience should reflect some shared elements. The consensus core components include the presence of an adversity, the influence of protective factors, and a subsequently more positive outcome [15]. Therefore, resilience is the spousal caregivers' capacity in the face of cancer events and caregiving distress and a successful adaptation process across times following cancer care in this study. Resilience is an important indicator of mental health in cancer caregiving, and caregivers' resilience was also being a predictor of their mental health after bereavement [3]. That is, caregivers who followed a resilient trajectory express more positive emotions and report a greater quality of life. As a positive psychological resource, resilience has a positive impact on adaptation and reduces risk factors for caregivers related to emotional distress, burden, fatigue and stress, and improved patient care [16]. Caregivers owning resilience can provide high-quality care for patients and improve patients' resilience [17]. In addition, family harmony and solidarity existed in families of resilient caregivers after bereavement, especially in aging caring [18]. Therefore, understanding the trajectory of resilience specific to spousal caregivers can provide a valuable opportunity for early identification and targeted intervention to improve resilience during cancer care.

Resilience refers to a dynamic process of positive adaptation within the context of significant adversity. It has been considered a personal protective factor for caregivers, improving their psychosocial well-being during or after facing responding to an illness, such as shouldering the burden of caring [19], emotional distress [20], self-efficacy [21], coping strategies [21], and other psychosocial functions [22,23]. However, when describing the trajectories of resilience in caregivers, much of our current understanding relies on studies about resilience in other groups, and researchers can only assume that spousal caregivers of advanced cancer patients follow the same trajectories as described after other types of trauma [24–26]. Existing studies have analyzed the changes in caregiver burden, depressive symptoms, and PTSD as outcome variables, but these have often not considered resilience as a dependent variable and, as such, there are no reports on the trajectory of resilience in spousal caregivers of advanced cancer patients. In addition, due to a few different factors across studies such as instruments used to measure resilience, time of assessment, population characteristics, and cut-off point scores, caregivers experienced different levels of burden, distress, and needs [27–29]. However, regarding the instruments used to measure resilience, most studies have reported that post-adversity resilience outcomes are more than merely the absence of PTSD, depressive symptoms, or caregiver burden [3,7,30]. Therefore, it is important to explore distinct trajectory patterns of resilience process using the resilience instruments during care for cancer patients.

To our knowledge, longitudinal studies about the resilience of spousal caregivers to advanced cancer patients are scarce. Most research focused on patients rather than their partners during suffering from adversities. Spouses of advanced cancer caregivers often failed to seek medical and psychological assistance for themselves [11]. In China, the trajectory of resilience was found in cancer patients but ignoring their husbands and wives [31]. As a result, difficulties arise for healthcare professionals in being able to perform timely assessments to determine whether caregivers may be at risk for mental dysfunction based on their individual trajectory of resilience. In addition, to date, most studies on resilience in caregivers of cancer patients have been cross-sectional designs at one single time point [22,23]. For example, one cross-sectional survey on caregivers of patients with advanced cancer in Taiwan, looking at the first six months post-initial treatment, reported that 33.8% of caregivers showed moderate resilience, while 61.5% showed low resilience [32]. Taken together, it is not possible to investigate resilience as a dynamic concept by this type of design, which limits the generalization of the obtained results.

Due to the unobservable nature of the construct, resilience cannot be measured physically, only inferred via the measurement of positive adaptation after experiencing adversity. Two popular means of operationally defining resilience in longitudinal studies are behavioral symptom methods and questionnaire measurement. For example, many qualitative inquiries have been used to explore resilience [33,34]. Some longitudinal studies, using other concepts, have found that those who adapt most effectively to the cancer diagnosis do so after the first six months [35]. Meanwhile, about 27% to 35% of advanced cancer caregivers report clinically significant symptoms of anxiety and depression during a patient's course of treatment [36]. Other studies on the resilience of spousal caregivers have focused on the period after the patient's death [37,38]. These existing findings on resilience are useful, but also point to the need to identify the actual trajectory of resilience in spousal caregivers who are caring patients with advanced cancer. Moreover, shortcomings of behavioral symptom methods include impediments to granularity and generalizability. Recently, resilience questionnaire measurements have been widely used such as the Connor-Davidson Resilience Scale, the Brief Resilience Scale, and the Resilience Scale for Adults. These measurements have been developed under the assumption that resilience is a universal concept that can be operationalized uniformly across populations and age groups using a single scale. Repeat observations of resilience captured by psychometric scales can be used to describe continuity or change in resilience over time [39]. Therefore, the level of resilience in this study was assessed by using the Conner Davidson Resilience Scale which is the most common instrument to assess resilience among adults.

Once a patient has received a diagnosis, treatment would normally begin right away. Resilience can help both patients and their spouses cope with the cancer diagnosis after having started treatment [40], as patients and spousal caregivers are given little time to process the diagnosis, having just received it, before they are confronted with new and unfamiliar cancer treatments. Several longitudinal studies have confirmed that the first six-month interval following the diagnosis or start of treatment is a time of significant stress for caregivers [13,41]. After the six-month point, having had time to adjust, caregivers tend to be more familiar with the process and possible complications of the related treatment. Therefore, the first six-month interval following diagnosis is a particularly significant time of stress for caregivers, and an important period to investigate changes in resilience.

The conceptual model of this study was based on the resilience temporal framework [24], which highlighted the resilience process and the resilient outcome, specifically, that these can be acquired through exposure to stressors or adversity and may change over time. Bonanno's framework and previous empirical research highlighted the resilience process and the resilient outcome, specifically, that these can be acquired through exposure to stressors or adversity and may change over time [24,42,43]. Conceptually, resilience is a process that leads to an outcome, and the central focus of resilience research is on moderating processes. To help distinguish between process and outcome, Ungar suggested that “resilience” was best used as a process definition, and that “resilient” was to be reserved for an outcome definition [43]. Galatzer-Levy et al. synthesized the trajectories of responses to potentially traumatic events [42], considering resilience, recovery, chronic stress, and delayed onset, using latent growth modeling in accordance with the resilience temporal framework [24]. However, to help distinguish between process and outcome, Galatzer-Levy et al. suggested that “resilience” was best used as a process definition, and that “resilient” was to be reserved for an outcome definition [42]. Therefore, post-adversity

resilient outcomes are unknown such as increase, decrease or stable among different time points which could map the trajectory of resilience.

Overall, resilience can vary within one individual across time and circumstance. A longitudinal design to explore changes in resilience over time is better than a cross-sectional design. Current literature had identified caregivers' resilience process at broad stages of cancer caring, whereas such broad stages may be too general to inform the practice of targeting specific interventions at different stages. Moreover, very few studies had investigated change in resilience among spousal caregivers over time in a dynamic perspective. Therefore, this study used latent growth modeling to capture changing information on resilience from the time of initial treatment to 6 months post-treatment after newly-diagnosed advanced cancer. The purpose of this study was to investigate the trajectories of the change in resilience of spousal caregivers for advanced cancer patients over the first six-month period after the patients' initial treatment in a Chinese context and to identify the various change patterns that existed in the trajectory of resilience of participants during the study period. We hypothesize that resilience among spousal caregivers of advanced cancer patients would change across three time points; and it would show different patterns of changes in resilience process following caring for cancer patients.

2. Methods

2.1. Participants

The eligible sample of spousal caregivers of advanced cancer patients was first recruited initially from 10 tertiary hospitals in Yancheng City in Jiangsu Province, China. Participants were husbands/ wives who provided direct care to their partners, who were newly-diagnosed advanced cancer patients (i.e., within the first month of initial treatment, and at Stage III or Stage IV using the TNM diagnosis system). Inclusion criteria were: 1) over 18 years old, 2) providing care for a patient undergoing cancer treatment with the current cancer treatment having taken place for less than one month, 3) able to communicate, read, and write in the Chinese language, and 4) willing to participate in a three-time point investigation throughout the study's full follow-up period. Exclusion criteria: those who took care of the patients died within six months after treatment.

2.2. Procedures

A longitudinal survey design with a population-based approach was used. This study was approved by the Institutional Review Board (IRB) of Burapha University (Number G-HS081/2564) and the Clinical Research Ethics Committee at Jiangsu Vocational Medicine of College (Number 2021-0901), and was registered in the Chinese Clinical Trial Registry (Trial registration number ChiCTR2100054048). Written informed consent was obtained from all study participants. First, 400 newly-diagnosed advanced cancer patients were identified in the hospitals. Then, 366 participant identities were anonymized by assigning unique identification numbers to maintain their confidentiality while being able to match data during follow-ups. Next, there were 360 participants who were willing to attend the baseline survey when their patients first month post-initial treatment (T1) and again at the two

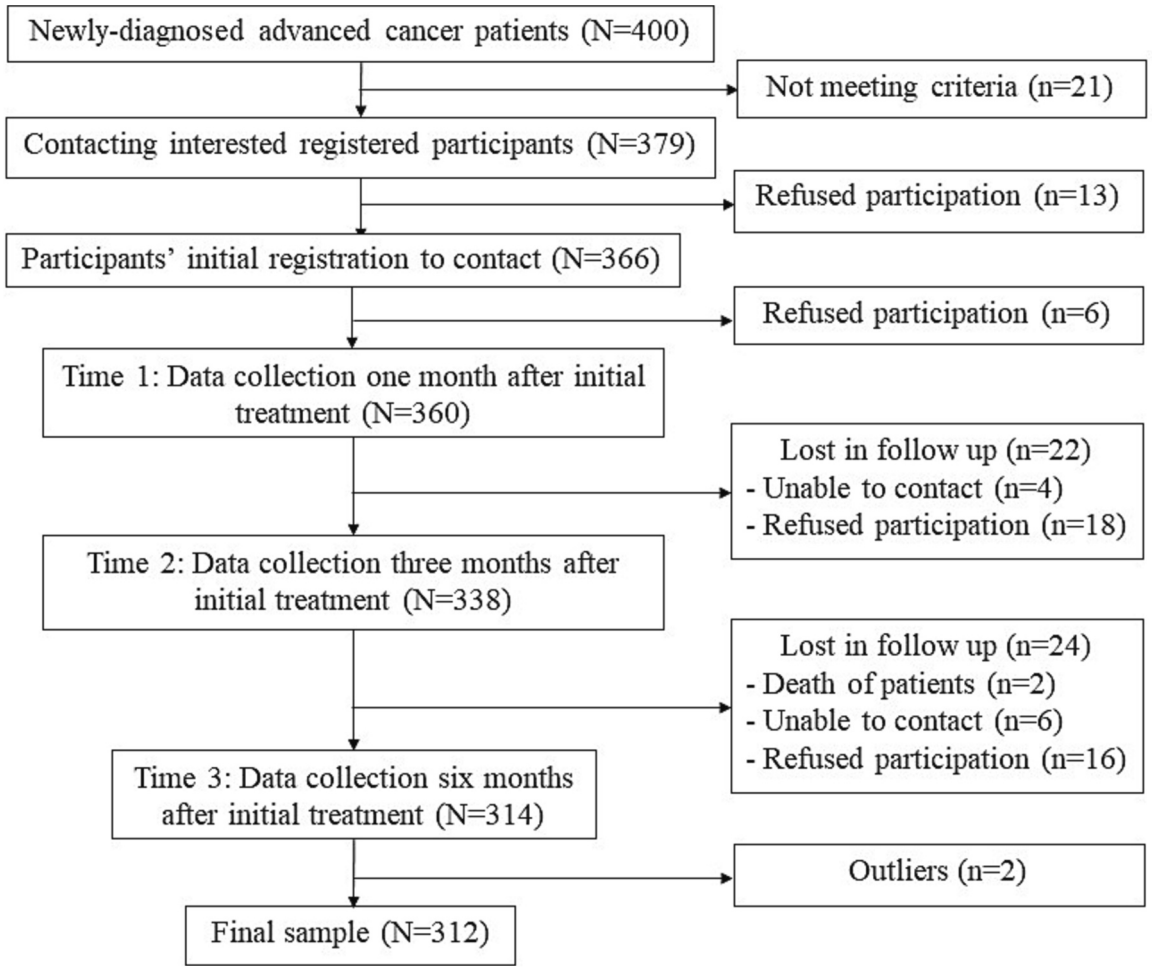

Fig. 1. Participant data collection flowchart.

follow-up time points three months post-initial treatment (T2), and six months post-initial treatment (T3). Among them, 338 participants were effectively followed up at T2 with a follow-up rate of 93.8% (338/360) and 314 participants at T3 with a follow-up rate of 87.2% (314/360). Finally, 312 participants with valid resilience scores on all three times measurement occasions were included in the analysis. Participants were able to withdraw from the study at any time without giving any reason. The flowchart of the data collection process shows in Fig. 1.

2.3. Measurement

2.3.1. Sociodemographic characteristics

The sociodemographic questionnaire was used to collect information on participant characteristics and clinical data from spousal caregivers at the baseline time point, including participants' gender, age and duration of their marriage. In addition, demographic characteristics of the patients with advanced cancer were also collected, including their age, type of cancer, stage of cancer, and types of treatment they were undergoing. The description of this measure is presented in Table 1.

2.3.2. Resilience

Resilience was assessed using the Connor–Davison Resilience Scale (CD-RISC) [44]. A total of 25 items are each rated on a five-point scale (0 = not true at all, 1 = rarely true, 2 = sometimes true, 3 = often true, 4 = true nearly all of the time). The total score is the sum of all responses ranging from 0 to 100. Higher scores represent higher resilience. The CD-RISC-25 has a good history of documented validity. The original scale demonstrated convergent validity with a hardiness scale ($r = 0.83$) and a perceived stress scale ($r = 0.76$). And the original -item CD-RISC-25 has been shown to have good internal consistency ($\alpha = 0.89$) and test-retest reliability ($r = 0.87$), and excellent structural validity according to goodness of fit tests. In this study, the level of resilience was measured by the Chinese version CD-RISC [45]. Strong reliability was evidenced at each time point, with Cronbach's alpha ranging from 0.851 to 0.896.

2.4. Statistical analysis

Data analyses were performed using IBM SPSS version 25.0 statistical software (Armonk, New York, USA), and p-values <0.05 were considered statistically significant. Continuous variables were described by the mean and standard deviation (SD). Categorical variables were reported as frequencies and percentages. Demographic variables were summarized using descriptive statistics. Latent growth modeling (LGM) with Mplus version 8.3 statistical programs were used to explore the trajectory of resilience over time and identify predictive factors associated with its change statistically. First, latent growth curve modeling (LGCM) was used to capture overall changes in resilience over time. Unconditional LGCM was applied to characterize the trajectory of resilience as reflected in the resilience total score over time with a random intercept and a random slope to examine variances for growth factors and model fit indices. Then, growth mixture modeling (GMM) was applied to analyze the longitudinal resilience data in the present study, and to explore the existence of multiple unobserved resilience subpopulations related to different resilience change trajectories. The appropriateness of models is assessed using standard global indices to determine goodness-of-fit indicators in LGCM [46]: chi-square test ($\chi2$), $\chi2$ /degrees of freedom (df), comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Likewise, Akaike Information Criterion (AIC), Bayes Information Criterion (BIC) and Sample-size adjusted BIC (aBIC) were used to compare nested models, with the lower value indicating the better fitting model. As recommended by Hooper et al. [47] and Marsh et al. [48], the following fit values were used to determine a good fit in this study: $\chi2/df < 3.0$, CFI ≥ 0.90, TLI ≥ 0.90, RMSEA<0.05- 0.08, SRMR<0.08. AIC, BIC and aBIC with a lower value of AIC indicated a better fitting model. However, the chi-square statistic was interpreted with caution as it tends to over-reject models that are a good fit based on other fit indices, especially in small sample sizes or in the face of non-normality. Thus, the p-value of $\chi2$ was not applied to assess the goodness of fit.

In addition, the overall fit of the different class models of GMM can be evaluated in the below indicators: (1) -2Log likelihood, AIC, BIC, and aBIC as the comparison of nested models, with the lower the values, the better the fit of the model to the data [49]; (2) Lo-Mendell-Rubins adjusted likelihood ratio test (LMR) and the parametric bootstrapped likelihood ratio test (BLRT) assess whether a given model with k classes provides significantly more information than the previous model with k-1 classes, and a statistically significant p-value indicates that the current solution is a significantly better fit [50]; (3) Entropy indicates classification accuracy that assesses whether respondents have been classified into one and only one latent class. As a standard index, entropy ranges from 0 to 1.0, and a value closer to 1.0 denotes a better classification of individuals. Moreover, interpretability is also an important factor to consider when selecting the optimal mixture models [49]. Moreover, each class was distinct and separated from other classes and consistent with the resilience temporal framework.

Table 1
Characteristics of Participants and Patients at Final Follow-up ($N = 312$).

Characteristics	Caregivers *N (%)*	Patients *N (%)*
Gender		
Male	133(42.6)	179(57.4)
Female	179(57.4)	133(42.6)
Religion		
No	286(91.7)	
Yes	26(8.3)	
Cancer type of patients		
Lung cancer		86 (27.6)
Gastric cancer		59 (18.9)
Colorectal cancer		57 (18.3)
Breast cancer		46 (14.7)
Liver cancer		40 (12.8)
Other		24 (7.7)
Cancer stage of patients		
III		228 (73.1)
IV		84 (26.9)
Cancer treatment of patients		
CT		45 (14.4)
Surgery+ CT		175 (56.1)
CT+ RT		39 (12.5)
Surgery+ CT+ RT		53 (17.0)

Note: CT, chemotherapy; RT, radiotherapy.

3. Results

3.1. Characteristics of participants and clinical characteristics of patients

There were 312 participants who met the inclusion criteria and agreed to participate in the three follow-up stages of the study. Table 1 presents the demographics of the study participants and the clinical characteristics of the patients. Their mean age was 56.38 ± 10.51 years, and the mean of their years of marriage was 30.00 ± 11.32. Most of the participants (57.4%) were wives of the cancer patients. The mean age of patients was 56.43 ± 11.02 years. The type of newly-diagnosed advanced cancer was primarily one of the top five commonly diagnosed cancer types in China: lung cancer, gastric cancer, colorectal cancer, liver cancer, or breast cancer. In terms of TNM diagnosed with cancer, 73.1% were at stage 3. Only 14.4% received single chemotherapy, other patients received cancer combination therapies.

3.2. Unconditional LGCM for resilience level over time

The total resilience scores of participants ranged from 34 to 71 (54.01 ± 7.68) at T1, from 37 to 70 (56.20 ± 6.38) at T2, and from 38 to

75 (57.97 ± 6.70) at T3. There were three unconditional LGCMs estimated in the analysis. The non-growth model was first tested as a reference model. Then, a linear growth model and a latent basis growth model with a freely estimated time score were tested for estimating the intra-individual change in resilience across time. As shown in Table 2, the linear growth model presented the best fit to the data and adequately described the intra-individual change in resilience across time: $\chi^2 = 8.81$, $df = 3$, $p = 0.031$, $\chi^2/df = 2.94$; RMSEA = 0.07; CFI = 0.99; TLI = 0.99; SRMR = 0.06. This model also resulted in the lowest AIC and BIC values, also reflecting that it was the model with the best fit. Therefore, a linear model fit better than the other two model types, and the linear growth model was selected as the best fitting growth model. The unconditional linear growth model had a significant intercept mean ($M_i = 54.08$, $SE = 0.44$, $p < 0.001$) and a significant slope mean ($M_s = 1.98$, $SE = 0.23$, $p < 0.001$). The mean intercept indicates that, on average, participants had resilience scores of around 54. The mean slope indicates that, on average, resilience scores increased by 1.98 units at every measured time point during the six-month treatment period. That is to say that there was a significant increase in resilience from the baseline to the six-month follow-up point. Additionally, there was a negative and significant correlation between the intercept and slope factor ($r = -0.64$, $p < 0.001$), indicating that participants with a higher level of resilience at baseline demonstrated less change in resilience during the follow-up period.

3.3. Unconditional GMM for resilience level over time

A random sample of individual trajectories (n = 30) indicated that there was some variation around the mean trajectory, as was evident by a subset of individual trajectories shown in Fig. 2. The next step was to determine how many latent growth trajectory classes of resilience existed in the study sample. GMM enabled the identification of the following distinct trajectory classes of resilience. The model fit statistics for GMM with between one to five classes are shown in Table 3. Most model fit indices suggested the 2-class model was the optimal fit model (e.g., highest entropy values, significant BLRT and VLMR-LRT results). Although the LL, AIC, BIC and aBIC decreasing indicated a better model fit toward a 5-class model, the changes in them from one to two or from two to three classes were much more significant than from three to four or four to five classes. The 2-class solution was selected as the optimal unconditional model based on the small changes of BIC and aBIC and the smaller entropy class in the 3-class solution, as well as fit with theory, parsimony, and interpretability.

The model fit statistics for GMM with between one to five classes are shown in Table 3. Most model fit indices suggested the two-class model was the optimal fit model (e.g., highest entropy values, significant BLRT and VLMR-LRT results). Although the decreased LL, AIC, BIC, and aBIC indicated a better model fit for the five-class model, the changes in them from one to two or from two to three classes were much more significant than from three to four or four to five classes. The two-class solution was selected as the optimal unconditional model based on the small changes of BIC and aBIC values and the smaller entropy class in the three-class solution, as well as fit with theory, parsimony, and interpretability.

In the two-class solution model in Fig. 3, two groups showed increasing developmental trends but differed in absolute values, namely in fast-growth and slight-growth. The first class, containing 42.9% of the sample, exhibited a low level of resilience but showed a fast development across time. The second class contained 57.1% of the sample and exhibited a high level but slow development of resilience across time. The average resilience score in the "low resilience with fast-growth group" trajectory (C1) was 47.27. This trajectory was seen in 131 participants. In contrast, the average resilience score in the "high resilience with slight-growth group" trajectory (C2) was 59.23. This trajectory was seen in 181 participants. Furthermore, Wald *z*-tests were run to examine whether the differences in intercepts and slopes were statistically significant between the two classes. Wald *z*-tests revealed that spousal caregivers in the low resilience with fast-growth group (C1) and the high resilience with slight-growth group (C2) showed significantly different levels of resilience at baseline ($Wald\ Z = -158.981$, $p < 0.001$), as well as different slopes of change in resilience over time ($Wald\ Z = 48.361$, $p < 0.001$). Therefore, those spousal caregivers who had the lower level of resilience across the first six-month post-treatment time span showed a significantly steeper increase in resilience slope, relative to the high resilience with slight-growth group.

Table 2
Statistics of model fit index among the three models ($N = 312$).

Model fit criterion	Non-growth model	Linear growth model	Latent basis growth model
χ2	358.07	8.81	6.29
df	6	3	2
χ2/ *df*	59.67	2.93	3.15
AIC	6083.00	5739.14	5739.23
BIC	6094.23	5762.20	5765.43
aBIC	6084.72	5743.17	5743.23
RMSEA	0.43	0.07	0.08
CFI	0.36	0.99	0.99
TLI	0.68	0.99	0.98
SRMR	0.50	0.06	0.03

4. Discussion

The change in resilience increased significantly during the first six months after the initial treatment of patients newly-diagnosed with advanced cancer. Moreover, there was a significantly different rate of increase in spouses' resilience scores over the course of the patients' six-month treatment period. The findings of this study indicated that the mean scores of caregivers' resilience during the first month after treatment began were the lowest of all measured time points, and the mean scores increased significantly from the first to the sixth month after initial treatment. This finding supports the resilient outcome of the psychological resilience model [4].

The overall means of resilience of spousal caregivers in the current study at the three time points were 54.01 ± 7.68, 56.20 ± 6.37, and 57.97 ± 6.80, respectively. After a sample *t*-test, the scores in this study were all lower than the CD-RISC scores reported for the general population (80.4 ± 12.8) and primary caregivers (71.8 ± 18.4) (all $p < 0.001$) as reported by Connor and Davidson [44]. Moreover, the mean scores at three time points observed in this study were lower than those of the general Chinese community (65.4 ± 13.9) (all $p < 0.001$) [45]. However, the CD-RISC scores at T2 and T3 in the present study were similar to those reported in studies of family caregivers of stroke patients in North China (55.68 ± 11.01) (both $p > 0.05$) [51], and of family caregivers of patients with bipolar disorder in South China (57.34 ± 12.09) (both $p > 0.05$) [52], indicating that caregivers generally reported moderately low resilience at the early stages of a sudden or unexpected serious health event. It is noteworthy that resilience in the present study was lowest immediately after diagnosis, as compared to family caregivers of stroke patients ($t = -3.353$, $p = 0.001$) [50] and family caregivers of patients with bipolar disorder ($t = -3.698$, $p < 0.001$) [52]. This may be because newly-diagnosed advanced cancer is a huge trauma incident for families, and high levels of sadness and anxiety are often perceived as "normal" reactions to cancer diagnosis and treatment; thus, low resilience is due to unexpected "manageable" sadness and preoccupation with the disease. Additionally, although the scores of resilience in this study increased significantly, the mean value of change in resilience scores was small. A possible explanation is that follow-up time was short, and the process of psychological adaptation was also gradual improvement.

Our findings showed that the trajectory of change in resilience of spousal caregivers in our study was consistent with those reported in previous studies [53–56]. For instance, a longitudinal study found that

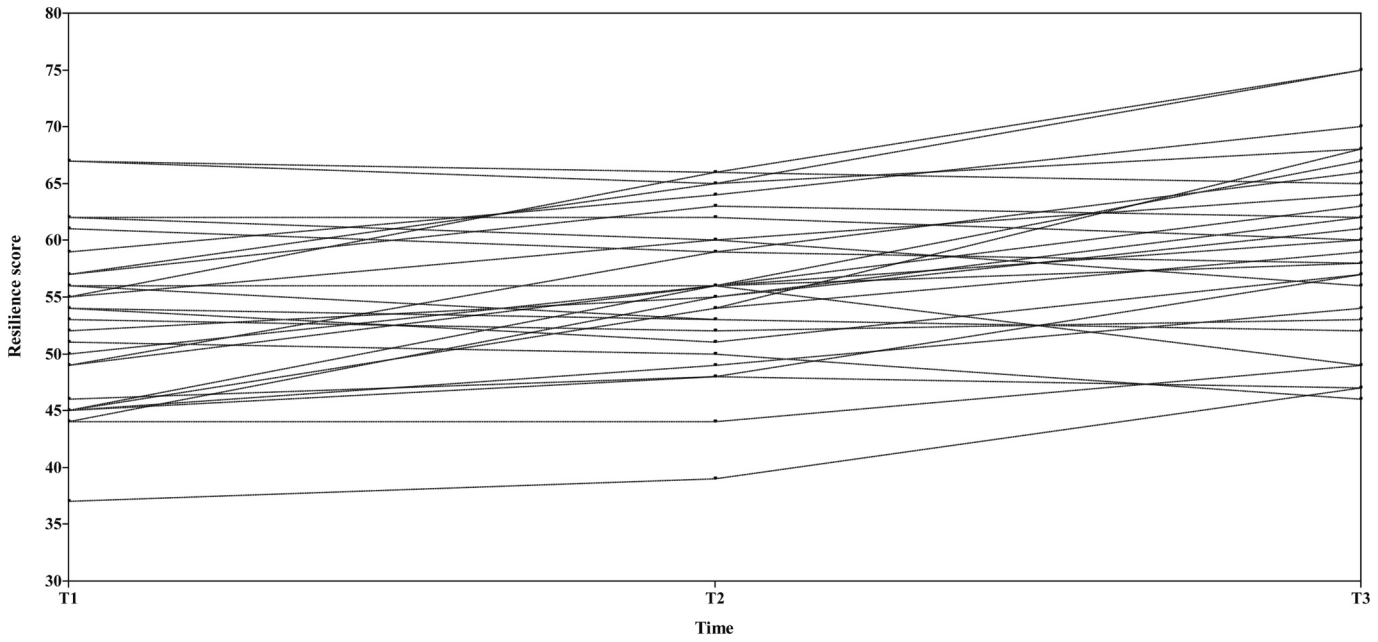

Fig. 2. A sample of observed individual trajectories (random subset, $n = 30$).
Note: T1 = first-month post-inital treatment, T2 = three months post-initial treatment, T3 = six months post-initial treatment.

Table 3
Fit indices for one- to five-class unconditional GMM for resilience in participants.

Class	LL	AIC	BIC	aBIC	Entropy	LMR (*p*)	BLRT (*p*)	Class probability
1	−3138.72	6287.44	6306.16	6290.30	–	–	–	1
2	**−2988.38**	**5992.16**	**6022.10**	**5999.73**	**0.80**	**<0.001**	**<0.001**	**0.429/ 0.571**
3	−2939.75	5901.50	5942.67	5907.78	0.78	0.145	<0.001	0.230/ 0.415/ 0.354
4	−2911.01	5850.02	5902.42	5858.01	0.79	0.111	<0.001	0.154/ 0.288/ 0.359/ 0.199
5	−2886.95	5807.91	5871.54	5817.62	0.78	0.352	<0.001	0.112/ 0.109/ 0.173/ 0.237/ 0.369

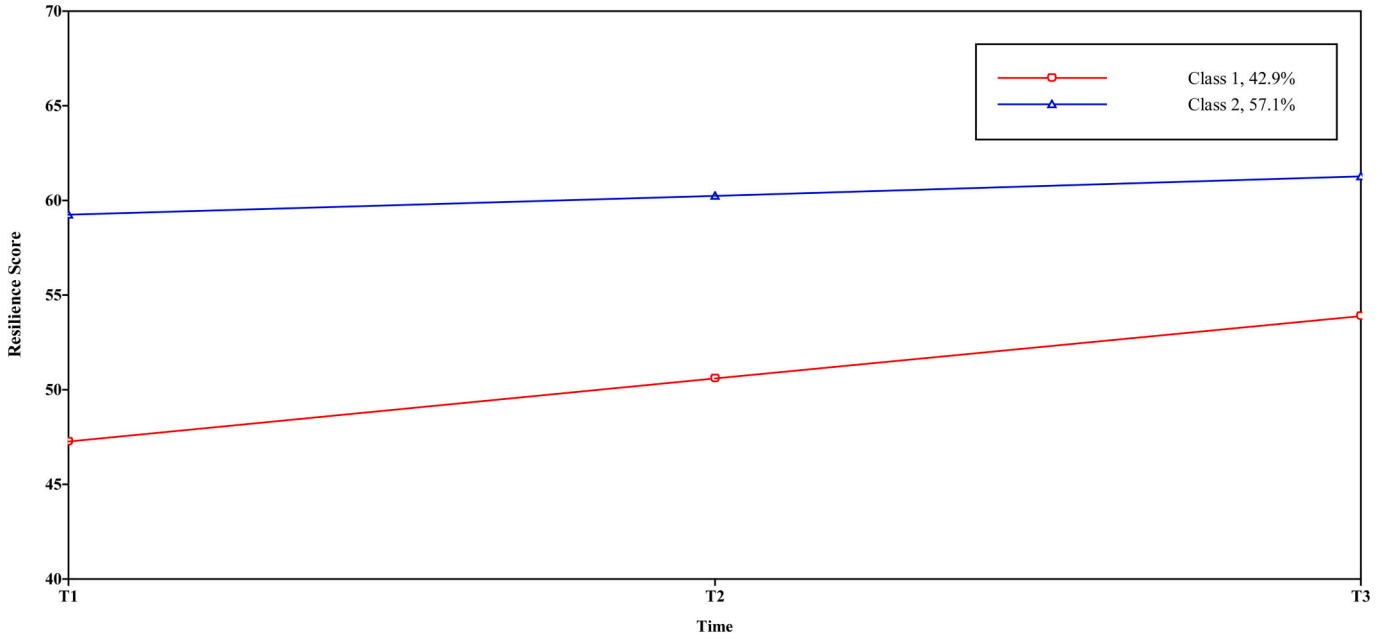

Fig. 3. Two latent classes for trajectory plots of resilience.
Note: T1 = first-month post-initial treatment, T2 = three months post-initial treatment, T3 = six months post-initial treatment.

the resilience scores of primary caregivers of patients with advanced head and neck cancer increased from the initial completion of treatment and peaking at the six months post-treatment time point, and holding relatively steady until the 12-month point [54]. In this study, changes in resilience showed significant growth during the first six months after the patient began treatment, but the rate of change became smaller over time. Meanwhile, a very similar resilient trajectory in 71.5% of caregivers of children with cancer, with low PTSD symptoms at baseline declined significantly over time with a significantly decreasing slope [56]. In other words, the trajectory of change in resilience was that there was growth, which is consistent with the general literature on human response to potentially traumatic events [42].

The current findings were inconsistent with those of one recent study, however, which found that the resilience of caregivers of acutely injured trauma patients reduced significantly from the patient's acute stage to the time point three months after patient discharge [57]. Meanwhile, the degree of family resilience in children of a parent with cancer decreased significantly over the four- to five-month time point, and the effect on family resilience was related to the time that had passed since the parent's cancer diagnosis [18]. In contrast, the score of resilience in mothers of children with cancer did not change between the 14 to 60 days following the diagnosis, nor between the time points three and six months later [58]. Another study, which used family efficacy as an indicator of resilience in caregivers of children receiving pediatric stem cell transplants, showed that family efficacy was stable for nine months post-discharge in LGCM [58]. These diverse findings support the theory that resilience is not a fixed trait, but rather it is responsive to adversity and is therefore amenable to interventions. Furthermore, considering differences in caregiver roles and in the potential trauma events, it seems reasonable that trajectories of change in resilience have been reported diversely. In the current study, the mean scores of spousal caregivers' resilience from the one-month to the three-month and six-month time points after the initial cancer treatment increased significantly, implying that growth in the resilience trajectory in this study was the most commonly observed change, which is similar to most existing research findings. For example, the resilience process in the context of the current study began with the diagnosis of advanced cancer, and may lead to the improvement of caregivers' mental well-being, benefit finding, and personal growth, while the outcomes which are influenced by contextual factors may be related to the degree of potentially traumatic events which further take place in the course of caregiving [4].

Bonanno's theory demonstrated that resilience is the most common feature of adults' response to adverse events, identifying trajectories of response to potential trauma events including resilience, recovery, delayed onset, and chronic stress [24]. That is, there exists a heterogeneity of responses to pronounced stressor events. By using the person-centered data latent variable modeling procedure, many studies have identified the trajectories of caregiver resilience over time. For example, Bonanno and Malgaroli found that 71% of individuals who had recently lost a spouse had a resilience trajectory measuring persistent complex bereavement disorder that declined slightly over time, and 58% of the sample was assigned to a resilience trajectory characterized by low grief symptoms measuring prolonged grief disorder which also declined slightly over time [59]. The results of the current study support the evidence of their claims that the road to resilience varies and increases gradually, as it did during the study period. The findings of our study further provide empirical support to the resilience temporal model proposing the trajectory of resilience in caregiver psychological recovery following a traumatic event [24]. In addition, the specific trajectory of parental caregiver resilience in the face of their child's cancer diagnosis and treatment has also been increasingly understood [60]. A longitudinal study displayed a linear growth model that has been found by measuring depressive symptoms from the baseline point before surgery, up to the six-month and 12-month post-surgery time points, in which parental caregivers showed considerable resilience in the face of their child's illness [61].

In the current study, we found two subgroups with similar outcome trajectories at the three data collection points, namely 42.9% following a low resilience with fast growth pattern, and 57.1% following a high resilience with slight growth pattern. This contributes to the existing literature by demonstrating the heterogeneity of resilience trajectories in caregivers. In the identification of trajectories in existing longitudinal quantitative studies, most researchers have determined whether the trajectory is resilient or not according to their own subjective interpretations of the slope and intercept of the trajectory [40]. Consequently, a researcher may choose to dub a trajectory “recovery” rather than “resilient” due to personal interpretation rather than based on conceptual differences. For example, a longitudinal study identified “resilient”, “recovery”, and “chronic” trajectories in caregivers of patients with a traumatic spinal cord injury based on previous research, but also according to their own judgment [30]. Actually, their recovery class exhibited reduced clinical distress over time and presented psychological positive adaptation, which is consistent with the concept of resilience according to the definition of the American Psychological Association [14]. Although the group defined as resilient in some other studies has not shown a significant slope, the mean scores of depression presented different levels over time, indicating that resilience did not remain static [62,63]. The current study showed new patterns of change in resilience combining the “resilient trajectory” and “recovery trajectory”. What is clear is that the path to resilience is not straight, linear, or static. The findings of the current study show new patterns of change in resilience, combining both the “resilient trajectory” and the “recovery trajectory”. The process of resilience when starting at a low level at the baseline point (i.e., the diagnosis of the patient's advanced cancer) led to rapid growth through positive coping; meanwhile, participants starting from a high level of resilience at baseline tended to present little growth, but did remain relatively stable. These findings, in combination with those of prior research, contribute significantly to enhancing our understanding of caregivers' psychological adaptation through the early months of their spouses' illness after diagnosis.

An individual's resilience process is influenced by a combination of genetics, personal history, environment and situational context [64]. It is important to note that low-resilient caregivers showed rapid growth at an early time. A possible reason may be that they have more social resources, good relationships with patients or better coping skills. Conversely, some caregivers who had a little high level of resilience may have more positive personality characteristics before adversity or genetic protective factors [65]. However, genetic protective factors may in fact mean that they are less sensitive to the effects of their environment which could lead to slow growth in social life [65]. The level of resilience in a newly-diagnosed advanced cancer event is also influenced by one's baseline adjustment, referring to how one functioned and adapted to other challenges prior to the diagnosis [24,66]. Obviously, the findings reinforce resilience as a highly dynamic process that may vary according to time, circumstance and population. Therefore, it is crucial that future research explore the mechanisms that improve resilience and enhance more understanding toward how individuals engage with protective factors and utilize them to overcome trauma or adversity. Health professionals should monitor the resilience process of spousal caregivers and provide assistance for them to cope with disease-related challenges.

4.1. Limitations

There are some limitations to the current study that should be acknowledged. One important one to consider is the length of the follow-up period. The current study entailed three waves of data collection over the first six months following the patient's initial treatment, meaning that only latent linear and latent basis models could be tested. Future research should include more follow-up time points to gain further knowledge about the trajectories of the resilience process. The second notable limitation is the generalizability of the current findings to other

groups, as the resilience variable in the spousal caregiver sample was gathered from eastern China. Moreover, self-reporting instruments should be another limitation to explain the objective nature of resilience. Future studies should use more accurate objective assessments in more different samples, regions, and languages to identify resilience changes.

4.2. Practical and research implications

The current study investigated caregivers' resilience longitudinally over a period of time rather than focusing on a single time point, and provided evidence of the dynamic process of resilience, which contributes to the wider area of current resilience research. In particular, our findings offer new knowledge about changes in patterns of resilience among spousal caregivers over a six-month period after a patient receives their initial cancer treatment. This study also provides great insight into the trajectory of change in spousal caregivers' resilience in the early phase of patient treatment. In light of the evidence that resilience is a dynamic process over time, it is crucial that professional researchers monitor psychological adjustment from numerous perspectives. The findings of this study, as well as those from previous existing literature, suggest that further focus on the process of resilience could help identify caregivers at risk for mental disorders at various points in time, and could advance the development of innovative prevention programs and treatment options.

The participants in this study were spouses who, outside of the patients themselves, were the most important stakeholders in chronic disease management and in the primary healthcare setting. Developing dyadic adjustments between caregivers and care receivers can help guide health and social care providers in planning appropriate interventions to promote psychological adaptations. This can have implications for healthcare providers, helping them to be attentive to the status of vulnerable caregivers who are at higher risk of elevated burden over time. Information about cancer therapy, symptom management, individual counseling, and support groups such as prayer services or social donations for families are also vital resources that can help caregivers cope and increase their understanding and knowledge of the diseases. Furthermore, because of circumstances such as the COVID-19 pandemic leading to necessary limitations in social interactions, economic impacts, and uncertainties, policymakers must pay more attention to family caregivers' well-being to help reduce their levels of stress and anxiety about their loved one's illness.

4.3. Conclusions

In summary, the current study has found that spousal caregivers of patients with newly-diagnosed advanced cancer show a dynamic development in their resilience during the first six months after the patient receives their initial cancer treatment. Moreover, two patterns of change in resilience were identified in the study, which adds to the current understanding of the conceptual characteristics of resilience.

Ethical statement

This study was approved by the Institutional Review Board (IRB) of Burapha University (Number G-HS081/2564) and the Clinical Research Ethics Committee at Jiangsu Vocational Medicine of College (Number 2021-0901), and was registered in the Chinese Clinical Trial Registry (Trial registration number ChiCTR2100054048).

Author contributions

All authors have made substantial contributions to all of the following: study design (HS, CW and PH), data collection and data analysis (HS), study supervision (PH and CW), manuscript writing (HS), and all authors final approval of the version to be submitted.

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Declaration of Competing Interest

No conflict of interest has been declared by the authors.

Data availability

The data that support the findings of this study are available on request from the first author.

References

[1] W. Wei, H. Zeng, R. Zheng, S. Zhang, L. An, R. Chen, S. Wang, K. Sun, T. Matsuda, F. Bray, J. He, Cancer registration in China and its role in cancer prevention and control, Lancet Oncol. 21 (2020) e342–e349, https://doi.org/10.1016/s1470-2045(20)30073-5.

[2] R. Zheng, S. Zhang, H. Zeng, S. Wang, K. Sun, R. Chen, L. Li, W. Wei, J. He, Cancer incidence and mortality in China, 2016, J Natl Cancer Cen. 2 (2022) 1–9, https://doi.org/10.1016/j.jncc.2022.02.002.

[3] S. Opsomer, J. De Lepeleire, E. Lauwerier, P. Pype, Resilience in family caregivers of patients diagnosed with advanced cancer-unravelling the process of bouncing back from difficult experiences, a hermeneutic review, Eur. J. Gen. Pract. 26 (2020) 79–85, https://doi.org/10.1080/13814788.2020.1784876.

[4] S. Opsomer, E. Lauwerier, J. De Lepeleire, P. Pype, Resilience in advanced cancer caregiving: a systematic review and meta-synthesis, Palliat. Med. 36 (2022) 44–58, https://doi.org/10.1177/02692163211057749.

[5] M. Miovic, S. Block, Psychiatric disorders in advanced cancer, Cancer. 110 (2007) 1665–1676, https://doi.org/10.1002/cncr.22980.

[6] F. García-Torres, M. Jacek Jabłoński, Á. Gómez Solís, J.A. Moriana, M.J. Jaén-Moreno, M.J. Moreno-Díaz, E. Aranda, Social support as predictor of anxiety and depression in cancer caregivers six months after cancer diagnosis: a longitudinal study, J. Clin. Nurs. 29 (2020) 996–1002, https://doi.org/10.1111/jocn.15123.

[7] Y.H. Lee, Y.C. Liao, S.C. Shun, K.C. Lin, W.Y. Liao, P.H. Chang, S.Y. Jhang, C.J. Yu, P.C. Yang, P.Y. Hsieh, Y.H. Lai, Trajectories of caregiver burden and related factors in family caregivers of patients with lung cancer, Psycho-Oncol. 27 (2018) 1493–1500, https://doi.org/10.1002/pon.4678.

[8] F. García-Torres, M.J. Jabłoński, Á. Gómez Solís, M.J. Jaén-Moreno, M. Gálvez-Lara, J.A. Moriana, M.J. Moreno-Díaz, E. Aranda, Caregiver burden domains and their relationship with anxiety and depression in the first six months of cancer diagnosis, Int. J. Environ. Res. 17 (2020) 4101, https://doi.org/10.3390/ijerph17114101.

[9] Y.P. Huang, S.Y. Wang, S.H. Chen, W.Y. Hsu, M.Y. Chang, The experience of spousal caregivers of patients recently diagnosed with cancer in Taiwan, Collegian. 26 (2019) 477–484, https://doi.org/10.1016/j.colegn.2018.12.005.

[10] T. Rumpold, S. Schur, M. Amering, A. Ebert-Vogel, K. Kirchheiner, E. Masel, H. Watzke, B. Schrank, Hope as determinant for psychiatric morbidity in family caregivers of advanced cancer patients, Psycho-oncol. 26 (2017) 672–678, https://doi.org/10.1002/pon.4205.

[11] Q.P. Li, Y.W. Mak, A.Y. Loke, Spouses' experience of caregiving for cancer patients: a literature review, Int. Nurs. Rev. 60 (2013) 178–187, https://doi.org/10.1111/inr.12000.

[12] Q. Li, Y. Xu, H. Zhou, A.Y. Loke, Factors influencing the health-related quality of life of Chinese advanced cancer patients and their spousal caregivers: a cross-sectional study, BMC Palliat. Care 15 (2016) 72, https://doi.org/10.1186/s12904-016-0142-3.

[13] C.Y. Lee, Y. Lee, L.J. Wang, C.Y. Chien, F.M. Fang, P.Y. Lin, Depression, anxiety, quality of life, and predictors of depressive disorders in caregivers of patients with head and neck cancer: a six-month follow-up study, J. Psychosom. Res. 100 (2017) 29–34, https://doi.org/10.1016/j.jpsychores.2017.07.002.

[14] American Psychiatric Association, The Road to Resilience, Available from: http://www.apa.org/helpcenter/road-resilience.aspx (accessed 13 December 2020).

[15] S.M. Southwick, G.A. Bonanno, A.S. Masten, C. Panter-Brick, R. Yehuda, Resilience definitions, theory, and challenges: interdisciplinary perspectives, Eur. J. Psychotraumatol. 5 (2014) 25338, https://doi.org/10.3402/ejpt.v5.25338.

[16] C. Palacio, A. Krikorian, J.T. Limonero, The influence of psychological factors on the burden of caregivers of patients with advanced cancer: resiliency and caregiver burden, Palliat. Support. Care 16 (2018) 269–277, https://doi.org/10.1017/S1478951517000268.

[17] Y. Li, Y. Lin, H. Zhou Xu, The impact of depression and anxiety on quality of life in Chinese cancer patient-family caregiver dyads, a cross-sectional study, Health Qual. Life Outcomes 16 (2018) 230, https://doi.org/10.1186/s12955-018-1051-3.

[18] C.M. Chen, B.F. Du, C.L. Ho, W.J. Ou, Y.C. Chang, W.C. Chen, Perceived stress, parent-adolescent/young adult communication, and family resilience among adolescents/young adults who have a parent with cancer in Taiwan: a longitudinal study, Cancer Nurs. 41 (2018) 100–108, https://doi.org/10.1097/NCC.0000000000000488.
[19] Y. Li, X. Qiao, S. Luan, K. Li, Wang, family resilience and psychological well-being among Chinese breast cancer survivors and their caregivers, Eur. J. Cancer Care 28 (2019), e12984, https://doi.org/10.1111/ecc.12984.
[20] R. Dias, J.P. Simões-Neto, R.L. Santos, M.F. Sousa, M.A. Baptista, I.B. Lacerda, N. R. Kimura, M.C. Dourado, Caregivers' resilience is independent from the clinical symptoms of dementia, Arq. Neuropsiquiatr. 74 (2016) 967–973, https://doi.org/10.1590/0004-282X20160162.
[21] Z.J. Ye, H.J. Guan, L.H. Wu, M.Y. Xiao, D.M. Luo, X.M. Quan, Resilience and psychosocial function among mainland Chinese parents of children with cancer: a cross-sectional survey, Cancer Nurs. 38 (2015) 466–474, https://doi.org/10.1097/NCC.0000000000000220.
[22] H. Sun, Y. Qin, P. Hengudomsub, Factors associated with resilience in spousal caregivers of patients with cancer: an integrative review, Nurs. Open 8 (2021) 2131–2141, https://doi.org/10.1002/nop2.771.
[23] G.C. Palacio, A. Krikorian, M.J. Gómez-Romero, J.T. Limonero, Resilience in caregivers: a systematic review, Am. J. Hosp. Palliat. Care 37 (2020) 648–658, https://doi.org/10.1177/1049909119893977.
[24] G.A. Bonanno, S.A. Romero, S.I. Klein, The temporal elements of psychological resilience: An integrative framework for the study of individuals, families, and communities, Psychol. Inq. 26 (2015) 139–169, https://doi.org/10.1080/1047840X.2015.992677.
[25] A.S. Masten, Ordinary magic: resilience processes in development, Am. Psychol. 56 (2001) 227–238, https://doi.org/10.1037//0003-066x.56.3.227.
[26] A.R. Rosenberg, K.S. Baker, K.L. Syrjala, A.L. Back, J. Wolfe, Promoting resilience among parents and caregivers of children with cancer, J. Palliat. Med. 16 (2013) 645–652, https://doi.org/10.1089/jpm.2012.0494.
[27] B.A. Given, C.W. Given, P.R. Sherwood, Family and caregiver needs over the course of the cancer trajectory, J. Support. Oncol. 10 (2012) 57–64, https://doi.org/10.1016/j.suponc.2011.10.003.
[28] T. Rumpold, S. Schur, M. Amering, K. Kirchheiner, E.K. Masel, H. Watzke, B. Schrank, Informal caregivers of advanced-stage cancer patients: every second is at risk for psychiatric morbidity, Support Care Cancer 24 (2016) 1975–1982, https://doi.org/10.1007/s00520-015-2987-z.
[29] H. Sun, Q. Qian, Y. Qin, L. Guo, P. Hengudomsub, Dynamic changes in resilience among family caregivers in the face of healthcare challenges: a scoping review, Arch. Psychiatr. Nurs. 45 (2023) 113–123, https://doi.org/10.1016/j.apnu.2023.06.006.
[30] T.R. Elliott, J.W. Berry, J.S. Richards, R.M. Shewchuk, Resilience in the initial year of caregiving for a family member with a traumatic spinal cord injury, J. Consult. Clin. Psychol. 82 (2014) 1072–1086, https://doi.org/10.1037/a0037593.
[31] X. Zhang, X. Wu, S. Han, X. Zhang, Longitudinal study on predictors of resilience in patients with gastric cancer during chemotherapy, Chin. Ment. Health J. 33 (2019) 695–700, https://doi.org/10.3969/j.issn.1000-6729.2019.09.011.
[32] S.C. Chen, B.S. Huang, T.M. Huang, C.Y. Lin, Y.L. Chang, C.F. Chung, Chung, factors associated with resilience among primary caregivers of patients with advanced cancer within the first 6 months post-treatment in Taiwan: a cross-sectional study, J. Nurs. Scholarsh. 52 (2020) 488–496, https://doi.org/10.1111/jnu.12582.
[33] W.J. Donnellan, K.M. Bennett, L.K. Soulsby, How does carer resilience change over time and care status? A qualitative longitudinal study, Aging Ment. Health 23 (2018) 1510–1516, https://doi.org/10.1080/13607863.2018.1503998.
[34] S.W. Gibbons, A. Ross, L. Wehrlen, S. Klagholz, M. Bevans, Enhancing the cancer caregiving experience: building resilience through role adjustment and mutuality, Eur. J. Oncol. Nurs. 43 (2019), 101663, https://doi.org/10.1016/j.ejon.2019.09.004.
[35] E.E. Meyers, K.M. Shaffer, M. Gates, A. Lin, J. Rosand, A.M. Vranceanu, Baseline resilience and posttraumatic symptoms in dyads of neurocritical patients and their informal caregivers: a prospective dyadic analysis, Psychosomatics. 61 (2020) 135–144, https://doi.org/10.1016/j.psym.2019.11.007.
[36] K. Oechsle, A. Ullrich, G. Marx, G. Benze, F. Wowretzko, Y. Zhang, L.M. Dickel, J. Heine, K.N. Wendt, F. Nauck, Prevalence and predictors of distress, anxiety, depression, and quality of life in bereaved family caregivers of patients with advanced cancer, Am. J. Hosp. Palliat. Care 37 (2020) 201–213, https://doi.org/10.1177/1049909119872755.
[37] K.M. Bennett, D. Morselli, S. Spahni, P. Perrig-Chiello, Trajectories of resilience among widows: a latent transition model, Aging Ment. Health 24 (2020) 2014–2021, https://doi.org/10.1080/13607863.2019.1647129.
[38] G.A. Bonanno, Loss, trauma, and human resilience: have we underestimated the human capacity to thrive after extremely aversive events? Am. Psychol. 59 (2004) 20, https://doi.org/10.1037/0003-066X.59.1.20.
[39] T.D. Cosco, A. Kaushal, R. Hardy, M. Richards, D. Kuh, M. Stafford, Operationalising resilience in longitudinal studies: a systematic review of methodological approaches, J. Epidemiol. Community Health 71 (2017) 98–104, https://doi.org/10.1136/jech-2015-206980.
[40] S. Opsomer, P. Pype, E. Lauwerier, J. De Lepeleire, Resilience in middle-aged partners of patients diagnosed with incurable cancer: a thematic analysis, PLoS One 14 (2019), e0221096, https://doi.org/10.1371/journal.pone.0221096.
[41] A. Girgis, S. Lambert, C. Johnson, A. Waller, D. Currow, Physical, psychosocial, relationship, and economic burden of caring for people with cancer: a review, J. Oncol. Pract. 9 (2013) 197–202, https://doi.org/10.1200/JOP.2012.000690.
[42] I.R. Galatzer-Levy, S.H. Huang, G.A. Bonanno, Trajectories of resilience and dysfunction following potential trauma: a review and statistical evaluation, Clin. Psychol. Rev. 63 (2018) 41–55, https://doi.org/10.1016/j.cpr.2018.05.008.
[43] M. Ungar, Nurturing Hidden Resilience in Troubled Youth, University of Toronto Press, 2018. https://www.jstor.org/stable/10.3138/9781442677975.
[44] K.M. Connor, J.R. Davidson, Development of a new resilience scale: the Connor-Davidson resilience scale (CD-RISC), Depress. Anxiety 18 (2003) 76–82, https://doi.org/10.1002/da.10113.
[45] X. Yu, J. Zhang, Factor analysis and psychometric evaluation of the Connor-Davidson resilience scale (CD-RISC) with Chinese people, Soc. Behav. Pers. 35 (2007) 19–30, https://doi.org/10.2224/sbp.2007.35.1.19.
[46] R.B. Kline, Principles and Practice of Structural Equation Modeling, 4th ed., Guilford Press, New York, NY US, 2015 (ISBN 978-1-4625-5191-0).).
[47] D. Hooper, J. Coughlan, M.R. Mullen, Structural equation modelling: guidelines for determining model fit, Electron J. Bus Res. Meth. 6 (2008) 53–60, https://doi.org/10.21427/D7CF7R.
[48] H.W. Marsh, Z. Wen, K.T. Hau, Structural equation models of latent interactions: evaluation of alternative estimation strategies and indicator construction, Psychol. Methods 9 (2004) 275, https://doi.org/10.1037/1082-989X.9.3.275.
[49] B.J. Feldman, K.E. Masyn, R.D. Conger, New approaches to studying problem behaviors: a comparison of methods for modeling longitudinal, categorical adolescent drinking data, Dev. Psychol. 45 (2009) 652, https://doi.org/10.1037/1082-989X.9.3.275.
[50] K.A. Wickrama, T.K. Lee, C.W. O'Neal, F.O. Lorenz, Higher-Order Growth Curves and Mixture Modeling with Mplus: A Practical Guide, Routledge/Taylor & Francis Group, 2021, https://doi.org/10.4324/9781003158769.
[51] L. Fang, M. Dong, W. Fang, J. Zheng, Relationships between care burden, resilience, and depressive symptoms among the main family caregivers of stroke patients: a cross-sectional study, Front. Psychol. 13 (2022), 960830, https://doi.org/10.3389/fpsyt.2022.960830.
[52] I.J. Su, H. Liu, A. Li, J.F. Chen, Investigation into the psychological resilience of family caregivers burdened with in-home treatment of patients with bipolar disorder, J. Affect Disord. Rep. 3 (2021), 100059, https://doi.org/10.1016/j.jadr.2020.100059.
[53] Q. Chen, L. Terhorst, D.A. Geller, W. Marsh, M. Antoni, M.A. Dew, M. Biala, J. Weinstein, A. Tsung, J. Steel, Trajectories and predictors of stress and depressive symptoms in spousal and intimate partner cancer caregivers, J. Psychosoc. Oncol. 38 (2020) 527–542, https://doi.org/10.1080/07347332.2020.1752879.
[54] L.Y. Lee, B.S. Huang, C.Y. Lin, C.F. Chung, Y.L. Chang, S.C. Chen, Trajectories of resilience and related factors in primary caregivers of patients with advanced head and neck cancer: a longitudinal cohort study, J. Nurs. Scholarsh. 54 (2022) 191–201, https://doi.org/10.1111/jnu.12728.
[55] F. Muscara, M.C. McCarthy, S.J.C. Hearps, J.M. Nicholson, K. Burke, A. Dimovski, S. Darling, M. Rayner, V.A. Anderson, Trajectories of posttraumatic stress symptoms in parents of children with a serious childhood illness or injury, J. Pediatr. Psychol. 43 (2018) 1072–1082, https://doi.org/10.1093/jpepsy/jsy035.
[56] K. Sharp, R. Tillery, A. Long, F. Wang, H. Pan, S. Phipps, Trajectories of resilience and posttraumatic stress in childhood cancer: consistency of child and parent outcomes, Health Psychol. 41 (2022) 256–267, https://doi.org/10.1037/hea0001132.
[57] K. Heathcote, J. Sun, Z. Horn, P. Gardiner, R. Haigh, E. Wake, M. Wullschleger, Caregiver resilience and patients with severe musculoskeletal traumatic injuries, Disabil. Rehabil. 43 (2021) 2320–2331, https://doi.org/10.1080/09638288.2019.1698662.
[58] N. Lau, J.P. Yi-Frazier, K. Bona, K.S. Baker, E. McCauley, A.R. Rosenberg, Distress and resilience among adolescents and young adults with cancer and their mothers: An exploratory analysis, J. Psychosoc. Oncol. 38 (2020) 118–124, https://doi.org/10.1080/07347332.2019.1656317.
[59] R. Tillery, N.E. Joffe, C.A. Mara, S.M. Davies, A.L.H. Pai, Longitudinal examination of family efficacy following pediatric stem cell transplant, Psycho-Oncol. 27 (2018) 1915–1921, https://doi.org/10.1002/pon.4741.
[60] G.A. Bonanno, M. Malgaroli, Trajectories of grief: comparing symptoms from the DSM-5 and ICD-11 diagnoses, Depress. Anxiety 37 (2020) 17–25, https://doi.org/10.1002/da.22902.
[61] L.P. Barakat, R.E. Madden, G. Vega, M. Askins, A.E. Kazak, Longitudinal predictors of caregiver resilience outcomes at the end of childhood cancer treatment, Psycho-Oncol. 30 (2021) 747–755, https://doi.org/10.1002/pon.5625.
[62] M.N. Perez, A.H. Clawson, M.N. Baudino, P.F. Austin, L.S. Baskin, Y.M. Chan, E. Y. Cheng, D. Coplen, D.A. Diamond, A.J. Fried, T. Kolon, B. Kropp, Y. Lakshmanan, T. Meyer, N.J. Nokoff, B.W. Palmer, A. Paradis, D.P. Poppas, K.J.S. Reyes, P. Williot, C. Wolfe-Christensen, E.B. Yerkes, A.B. Wisniewski, L.L. Mullins, Distress trajectories for parents of children with DSD: a growth mixture model, J. Pediatr. Psychol. 46 (2021) 588–598, https://doi.org/10.1093/jpepsy/jsab004.
[63] W. Oh, M. Muzik, E.W. McGinnis, L. Hamilton, R.A. Menke, K.L. Rosenblum, Comorbid trajectories of postpartum depression and PTSD among mothers with childhood trauma history: course, predictors, processes and child adjustment, J. Affect. Disord. 200 (2016) 133–141, https://doi.org/10.1016/j.jad.2016.04.037.

[64] C.W.T. Huey, J.C. Palaganas, What are the factors affecting resilience in health professionals? A synthesis of systematic reviews, Med. Teach. 42 (5) (2020) 550–560, https://doi.org/10.1080/0142159X.2020.1714020.
[65] A. Stainton, K. Chisholm, N. Kaiser, M. Rosen, R. Upthegrove, S. Ruhrmann, S. J. Wood, Resilience as a multimodal dynamic process, Early Interv. Psychiatry 13 (2019) 725–732, https://doi.org/10.1111/eip.12726.
[66] S. Opsomer, S. Joossens, E. Lauwerier, J. De Lepeleire, P. Pype, Resilience in advanced cancer caregiving promoted by an intimate partner's support network: insights through the lens of complexity science: a framework analysis, BMC Palliat. Care 22 (2023) 12, https://doi.org/10.1186/s12904-023-01134-3.