



Research Article

The Influence of Resilience on the Coping Strategies in Patients with Primary Brain Tumors

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ABSTRACT

Purpose: The purpose of this study was to assess the amount of variance in the coping strategies of patients with brain tumors that could be accounted for by resilience.**Methods:** This cross-sectional survey involved 95 patients who had experienced surgical, chemotherapy, or radiotherapy therapies for their brain tumors at least 1 month before data collection. The investigator collected data using the scales of the Ways of Coping Checklist-Revised and Resilience Scale. Data were analyzed using descriptive statistics, t tests, analysis of variance, Pearson product–moment correlation, and hierarchical multiple regression.**Results:** The results revealed that resilience was significantly positively associated with patients' problem-focused coping ($r = .65, p < .001$) and total coping ($r = .49, p < .001$). In addition, resilience accounted for 27% ($R^2_{\text{inc}} = .27, p < .001$) and 16% ($R^2_{\text{inc}} = .16, p < .001$) of the distinct variances in predicting patients' problem-focused coping and total coping.**Conclusion:** The current results provide evidence to support the importance of resilience in shaping the coping strategies of relevant patients. As resilience shows a crucial element in patient coping with brain tumors, health team members should develop and employ appropriate strategies to improve the resilience of patients with brain tumors.© 2020 Korean Society of Nursing Science. Published by Elsevier BV. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Primary brain tumors comprise around 3% of all adult cancer diagnoses [1]. Patients with brain tumors commonly experience symptoms that relate to neurological impairment such as visual-perceptual deficits, weakness, and impaired cognition [2]. In addition, treatment for brain tumors usually incorporates surgery, chemotherapy, and radiotherapy. The complications of cancer

treatment and concerns over disease recurrence often interfere with the somatic and emotional well-being of patients [3]. Recognizing the coping strategies that patients use to deal with life-threatening illnesses is vital for health professionals to effectively assist brain tumor patients to cope with the complex situation related to this disease and its treatment.

Researches reveal that patients with brain tumor at their first diagnosis and at recurrence stage often use positive coping strategies; for example, they look for support and hope to employ problem-solving coping [4]. Patients most frequently use optimistic coping strategies to achieve less anxiety and better psychosocial well-being [5]. Most of the brain tumor patients adopt coping strategies to help with their emotional adjustment [5–7]. However, numerous patients use a negative pattern of thought which is deleterious for their emotional well-being [5]. For example, impaired physical functioning due to brain tumor may affect daily activities of living and ability to adopt effective coping strategies [4].

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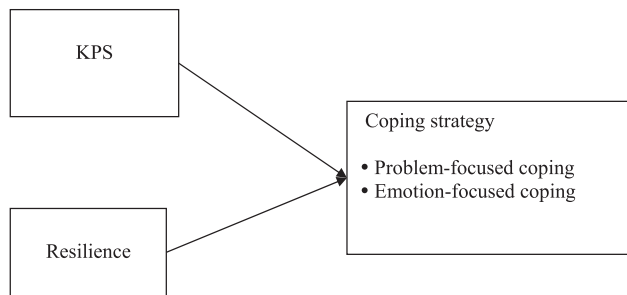


Figure 1. Concept framework for main variables of the present study. Note. KPS = Karnofsky Performance Status.

Coping is a process that employs both cognitive and behavioral efforts to control a stressful situation and to regulate the related emotions [8]. Coping comprises two main categories: managing the problem that is the cause of the distress (problem-focused coping) and controlling related, stressful emotions (emotion-focused coping) [9]. In problem-focused coping, individuals may search for social support or take actions to work through a difficulty. In emotion-focused coping, individuals may seek a more positive reappraisal of their situation or become involved in distracting activities [8]. Effective adjustment to the brain tumor experience requires that a patient successfully manage his or her behavior and emotions and maintain cognitive flexibility toward the illness to modify the stressful situation, for example, via resilience [10].

Resilience refers to the means and ability for effective adjustment [11]. Resilience helps an individual perceive that he or she may acquire the means and ability to adjust to both positive and negative events. The function of resilience infers that a person may overcome difficulties and be able to adapt better when he or she uses inner/internal strengths and abilities [11,12]. As a result, resilience helps to insulate individuals from distress during stressful situations and maintain their beliefs [13–15].

In regard to stress and coping [8], stress is an operation between the individual and environment. Individuals evaluate environmental requirements while weighing their abilities to experience these requirements. Resilience is the ability to help individuals to recover rapidly from interruptions in functioning that arise from stress evaluation and to return to the prior level of functioning [11]. Resilience relates to hope and to the problem-solving style, goal focus, and flexible coping capabilities of the individual [11,12,16]. Higher levels of resilience have been associated with higher adoption of task-oriented coping [12,17,18] and to lower adoption of emotion-oriented coping in young adults [12]. While the importance of resilience to the maintenance and restoration of somatic and emotional well-being in patients with chronic illness has been reported [10,14], little research has been done to explore how resilience helps brain tumor patients cope with their disease. Understanding the factors that influence coping strategies in patients with brain tumor will provide empirical evidence to help clinicians tailor health care to match individual needs. This study was designed to assess how much of the variance in the coping strategies of patients with brain tumors could be accounted for by resilience (see Figure 1).

Methods

Study design

This study involved a cross-sectional design with a convenience sample to measure how much of the variance in the coping strategies of patients with brain tumors could be accounted for by resilience.

Setting and sample

The sample consisted of 95 patients recruited from one teaching hospital in Taipei City. The sample size was calculated using G-power 3.1 based on a significance level of .05, a power of .80, a confidence interval of .95, and a medium effect size of .20 [19]. Data were collected at the outpatient department of the neurosurgery unit. All of the patients who met the following eligibility criteria were invited to participate: (1) diagnosed with primary brain tumor, (2) had undergone surgery, radiotherapy, or chemotherapy to treat the tumor; (3) at least 1 month since the final treatment; and (4) at least 20 years of age. The exclusion criteria included patients who had cognitive deficits or their physical status that impeded their ability to self-report. After the initial screen by the clinicians, eligible patients were referred to the investigator for this study.

Ethical considerations

This study acquired approval from the research ethics committee of Taipei Veterans General Hospital (Approval no. 2014-09-007AC). Researchers explained the purpose and voluntary nature of the study, patients' confidentiality and anonymity, and patients' right to withdraw at any time. For example, the researchers just show the number instead of patients' name or any identifiable information on the questionnaires. Any publication of this study will not show patients' identifiable information. Informed consent was signed by all the patients after they understood the purpose of this study and agreed to participate in this study.

Measurements

Sociodemographic variables

Sociodemographic variables were measured, including gender, age, marital status, education level, household income, and financial means. Medical variables included tumor malignancy, treatment undertaken, and tumor recurrence. To evaluate the physical ability of patients, the Karnofsky Performance Status scale (KPS) was employed, with scores ranging from 0 (dead) to 100 (normal) [20]. Details of the sample in this study have been reported elsewhere [21,22]. For the purposes of this article, data obtained using the following instruments were analyzed. It took about 25 to 30 minutes to patients to complete the following instruments:

Coping scale (Ways of Coping Checklist-Revised)

Coping strategies were measured with the Chinese version of the coping scale [23] and a 42-item inventory consisting of problem-focused coping and emotion-focused coping. This scale originated from the Ways of Coping Checklist created by Lazarus and Folkman [8]. The construct validity of the Ways of Coping Checklist, Revised was verified by Vitaliano et al [24]. The Cronbach α for the Ways of Coping Checklist, Revised ranged from .74 to .88 [24] and was .80 for the Chinese version [23]. In this study, the Cronbach α was .89 for the total scale, .86 for problem-focused coping, and .84 for emotion-focused coping. Patients were asked to give scores on a four-point Likert-type scale with 0 = does not apply and or not used, 1 = used somewhat, 2 = used quite a bit, and 3 = used a great deal. Higher scores indicated that the related coping strategy was used more frequently.

Resilience Scale

Resilience was measured using the Chinese version of the Resilience Scale [25], a 25-item inventory consisting of two domains: personal competence and acceptance of self and life. The two dimensional structure was previously verified using factor analysis [25]. Yang's research verified the concurrent validity of the

Resilience Scale and revealed a significant and positive correlation with life satisfaction ($r = .30$) [26]. Internal consistency was confirmed with a Cronbach α of .95 [27]. Patients were asked to reply using a seven-point Likert-type scale, with a total possible score range of 25–175; higher scores indicating greater resilience. Scores ≥ 147 were defined as high resilience, scores from 121 to 146 were defined as mid-range resilience, and scores < 121 were defined as low resilience.

Data collection

The data were collected from November 2014 to May 2015. When patients finished their visit with the doctors, eligible patients were invited to participate in this study and directed to a quiet room for the questionnaires responses. The patient replied to the scale items on his/her own in writing or orally to items read by the investigator. Adequate time made available for patients to complete the questionnaires. After patients had completed the self-administered questionnaires, the investigator checked the questionnaires for any missing responses. Patients were asked to complete the items they had missed. The investigator collected sociodemographic data from the patients' medical charts.

Data analysis

The SPSS (IBM Corp., Armonk, NY, USA) 18.0 for Windows statistical program was used to perform all of the data analysis. Descriptive statistics, including mean, SD, frequency, and percentage, was used to identify the sociodemographic and medical variables of the patients. The associations among the sociodemographic variables, medical characteristics, and coping strategy were tested using analysis of variance and t test. In addition, the association between resilience and coping strategies was examined using the Pearson product-moment correlation. Hierarchical multiple regression was used to assess the degree to which resilience contributed to the variance in coping strategy.

Results

Demographics, medical characteristics, KPS, resilience, and coping strategies

The sample used in the present study included 95 outpatients with brain tumors. Most of the patients were female (61.1%), married (57.9%), holding a diploma, bachelor or higher level of education (62.1%), not employed (56.8%), relying on others for their financial means (58.9%), and having a monthly family income of NT\$ 40,000–80,000. Patients ranged in age from 21 to 68 years old, with a mean age of 47.74 ($SD = 12.15$) years. Around half had received a benign brain tumor diagnosis (51.6%), 35.8% had a diagnosis of tumor recurrence, and 55.8% had received surgery only. The mean KPS scores of patients were 90.32 ($SD = 11.71$, range = 60–100). The patients had a mean score for total resilience of 125.48 ($SD = 28.53$, range = 31–175). The mean scores were 2.79 ($SD = 0.52$, range = 1.14–3.95) for problem-focused coping, 2.07 ($SD = 0.58$, range = 0.62–3.57) for emotion-focused coping, and 2.43 ($SD = 0.45$, range = 1.19–3.48) for total coping strategy.

Relationships among demographic/medical characteristics, KPS, resilience, and coping strategy

Analysis of variances or independent-sample t tests were employed to analyze the differences in coping strategy among particular medical and demographic groups. The results revealed significant differences in the total coping strategy for patients who

had/had not experienced tumor recurrence ($t = -1.98$, $p = .050$). Patients with no tumor recurrence indicated a significantly higher score in total coping strategy. Besides, there were significant differences in the problem-focused coping levels of patients based on gender ($t = -2.04$, $p = .044$), treatment received ($t = 2.04$, $p = .044$), and tumor recurrence ($t = -2.64$, $p = .011$). Female patients, patients who had received surgery only, and patients who had experienced no tumor recurrence had significantly higher problem-focused coping scores in comparison with those in the opposite categories (see Table 1).

Pearson's correlation was used to analyze the relationships between coping strategy and the patients' KPS and resilience. KPS was found to correlate significantly and positively with total coping strategy ($r = .28$, $p = .007$) and problem-focused coping ($r = .37$, $p < .001$). Resilience was found to correlate significantly and positively with total coping strategy ($r = .49$, $p < .001$) and problem-focused coping ($r = .65$, $p < .001$) (Table 2). These results suggest that greater perceived KPS and resilience are associated with higher total coping strategy and problem-focused coping.

Demographic/medical characteristics, KPS, and resilience as predictors of coping strategy

Two hierarchical multiple regression analyses were employed to verify how much variance in the two evaluations of coping strategy (total coping strategy and problem-focused coping) could be attributed to the factors of gender, treatment received, tumor recurrence, KPS, and resilience; these were moved into the hierarchical multiple regression analysis to predict the total coping strategy and problem-focused coping of patients. All of the variables were selected because of the outcomes of an earlier analysis, which indicated a significant relationship with coping strategy (total coping strategy and problem-focused coping). For the first rung, we submitted gender, treatment received, and tumor recurrence as predictors. For rung two, we submitted KPS as the predictor. Finally, for rung three, we submitted resilience as the predictor. Aiming at total coping strategy, the results showed that the model was significant ($F = 10.37$, $p < .001$); only resilience ($R^2_{inc} = .16$, $p < .001$) proved a valid predictor of total coping strategy, accounting for 16% of the variance in total coping strategy. For problem-focused coping, the results revealed that the model was significant ($F = 16.12$, $p < .001$); gender ($\beta = .17$, $p = .030$) and resilience ($R^2_{inc} = .27$, $p < .001$) were valid predictors of problem-focused coping (see Table 3), with resilience accounting for 27% of the variance in problem-focused coping strategy.

Discussion

This study explored the correlation between resilience and coping strategy and assessed the degree to which resilience accounted for the variance in coping strategies used by patients with brain tumors. The results show significant associations between resilience and total coping strategy and between resilience and problem-focused coping. Importantly, our findings support that resilience significantly predicts the total coping strategy and the problem-focused coping of patients with brain tumors. The present study improves scholarly knowledge regarding resilience in terms of recognizing resilience as an important factor used by patients with brain tumor to cope with their disease.

The present study revealed that the average scores for problem-focused coping were higher than those for emotion-focused coping. The high mean score for KPS in the present study indicates that pursuing normal activities or having relatively minor health complaints [28] contribute to patients tending to choose problem-

Table 1 Demographic Characteristics by Coping Strategy (N = 95).

Variable	Group	n (%)	Total coping strategy			Problem-focused coping			Emotion-focused coping		
			M ± SD	t or F	p	M ± SD	t or F	p	M ± SD	t or F	p
Gender	Men	37 (38.9)	2.36 ± 0.39	t = -1.21	.231	2.66 ± 0.38	t = -2.04	.044	2.05 ± 0.58	t = -0.22	.826
	Women	58 (61.1)	2.47 ± 0.49			2.87 ± 0.58			2.08 ± 0.59		
Age (yrs)	<40	31 (32.6)	2.45 ± 0.33	F = 0.88	.457	2.79 ± 0.42	F = 0.26	.852	2.10 ± 0.38	F = 1.00	.397
	40–49	30 (31.6)	2.52 ± 0.45			2.84 ± 0.49			2.19 ± 0.63		
	50–59	20 (21.1)	2.35 ± 0.60			2.75 ± 0.63			1.95 ± 0.69		
	≥60	14 (14.7)	2.32 ± 0.47			2.71 ± 0.65			1.93 ± 0.69		
Married	No	28 (29.5)	2.43 ± 0.46	F = 0.19	.826	2.76 ± 0.50	F = 0.14	.871	2.09 ± 0.58	F = 0.19	.826
	Yes	55 (57.9)	2.41 ± 0.41			2.79 ± 0.48			2.04 ± 0.59		
	Other	12 (12.6)	2.50 ± 0.62			2.86 ± 0.78			2.15 ± 0.58		
Education level	Senior high school or below	36 (37.9)	2.40 ± 0.49	t = -0.45	.653	2.78 ± 0.59	t = -0.05	.964	2.02 ± 0.63	t = -0.66	.511
	Diploma/Bachelor or above	59 (62.1)	2.45 ± 0.43			2.79 ± 0.48			2.10 ± 0.56		
Employment status	Employed	41 (43.2)	2.44 ± 0.43	t = 0.23	.820	2.80 ± 0.48	t = 0.24	.807	2.08 ± 0.56	t = 0.14	.891
	Unemployed	54 (56.8)	2.42 ± 0.47			2.78 ± 0.56			2.06 ± 0.61		
Household income (NTD)	< 40,000	26 (27.4)	2.37 ± 0.60	F = 0.35	.707	2.76 ± 0.65	F = 0.09	.918	1.97 ± 0.74	F = 0.58	.562
	40,000–80,000	40 (42.1)	2.45 ± 0.37			2.81 ± 0.50			2.09 ± 0.47		
	> 80,000	29 (30.5)	2.45 ± 0.42			2.78 ± 0.44			2.13 ± 0.57		
Financial means	Self-supporting	39 (41.1)	2.45 ± 0.44	t = 0.42	.678	2.79 ± 0.49	t = 0.08	.939	2.11 ± 0.58	t = 0.58	.565
	Supported by others	56 (58.9)	2.41 ± 0.46			2.78 ± 0.54			2.04 ± 0.59		
Tumor malignancy	Benign	49 (51.6)	2.43 ± 0.40	t = -0.04	.966	2.77 ± 0.47	t = -0.32	.748	2.08 ± 0.57	t = 0.22	.826
	Malignant	46 (48.4)	2.43 ± 0.51			2.81 ± 0.57			2.06 ± 0.61		
Treatment undertaken	Surgery only	53 (55.8)	2.48 ± 0.45	t = 1.27	.206	2.88 ± 0.54	t = 2.04	.044	2.08 ± 0.55	t = 0.17	.863
	Surgery plus CTx or RTx or both	42 (44.2)	2.36 ± 0.45			2.67 ± 0.48			2.06 ± 0.63		
Tumor recurrence	Yes	34 (35.8)	2.31 ± 0.51	t = -1.98	.050	2.59 ± 0.60	t = -2.64	.011	2.03 ± 0.69	t = -0.51	.615
	No	61 (64.2)	2.50 ± 0.40			2.90 ± 0.44			2.10 ± 0.52		

Note. CTx = Chemotherapy; M = mean; NTD = New Taiwan Dollars; RTx = Radiotherapy; SD = standard deviation; yrs = years.

Table 2 Correlations Among the KPS, Resilience, and Coping Strategy of Participants (N = 95).

Variable	Total coping strategy		Problem-focused coping		Emotion-focused coping	
	r	p	r	p	R	p
KPS	.28	.007	.37	<.001	.10	.359
Resilience	.49	<.001	.65	<.001	.19	.069

Note. KPS = Karnofsky Performance Status.

focused coping strategies; Lazarus and Folkman [8] assert that problem-focused coping tends to be the norm when the stressful context is under control.

The results show that females reported higher mean scores than did males in problem-focused coping. Gender was noted as a significant predictor of problem-focused coping. These findings correspond to those of a previous study [29] and support that gender is a factor that influences the coping strategy adopted by cancer patients. However, our finding contradicts other studies that found that men are more likely to choose problem-focused coping, and women are more likely to choose emotion-focused coping

[30,31]. The difference in the tumor status and treatment undertaken by male and female patients might affect the results. As stress situations often accompany the cancer stage or treatment, Carver, Scheier, and Weintraub [32] assert, differing evaluations of comparable stress situations may lead to different coping choices between men and women. Gender may be a crucial issue to consider in building an understanding of the dynamics of the coping process of patients with brain tumor.

Patients with higher resilience reported higher scores for total coping strategy and problem-focused coping. Higher resilience was identified as a predictor of higher total coping strategy as well as higher problem-focused coping. This finding echoes the findings of earlier studies [12,33] and further supports the important impact of resilience on the coping strategies adopted by patients suffering from brain tumors.

Resilience is defined as positive adaption to settle a stressful situation [11]. Coping does not mean a successful resolution beyond efforts to change a stressful situation. However, problem-focused coping is used more often in stressful situations appraised as changeable to achieve problem solving [9]. Resilience may be an important factor to consider for understanding the process of problem-focused coping for patients.

Table 3 Hierarchical Multiple Regression Analysis of Variables Predicting Coping Strategy (N = 95).

Variable	B	SE B	β	p	R ²	R ² increment	F increment	p
Criterion: Total coping strategy								
Step 1: Tumor recurrence	.09	.09	.10	.292	.04	.04	3.93	.050
Step 2: KPS	.00	.00	.02	.864	.09	.05	5.22	.025
Step 3: Resilience	.07	.00	.46	<.001	.26	.16	19.87	<.001
Overall model								
			R ² = .26 [F (3, 91) = 10.37, p < .001]					
Criterion: Problem-focused coping								
Step 1: Demographic characteristics					.12	.12	4.10	.009
Gender	.19	.08	.17	.030				
Treatment undertaken	.03	.09	.03	.733				
Tumor recurrence	.17	.09	.16	.064				
Step 2: KPS	.00	.00	.03	.743	.20	.08	9.22	.003
Step 3: Resilience	.01	.00	.60	<.001	.48	.27	46.51	<.001
Overall model								
			R ² = .48 [F (5, 89) = 16.12, p < .001]					

Note. KPS = Karnofsky Performance Status.

Additionally, our findings correspond to the assertion of previous researchers that resilient individuals are active and effective problem solvers [12]. Resilient individuals are likely to have access to social support, to reflect hope and a capacity to make sense of things, and to possess personal resourcefulness in terms of flexibility, bravery, and persistence [12,16]. These attributes may trigger individuals to use problem-focused coping strategies when encountering a stressful event such as the identification and treatment of a brain tumor.

The current study shows that resilience was not identified as a significant predictor of emotion-focused coping, unlike prior research [12]. Many researches however show that resilience is not significantly correlated with patient's negative coping strategies [34,35]. Emotion-focused coping is likely to be adopted under an unchangeable stress appraisal [9]. Resilience is viewed as a positive adaptation in response to stress [11]. Use of resilience might not be as critical for patients under an unchangeable stress situation.

The significance of the current findings is supported by prior research that found a relationship between higher ranks of resilience and higher ranks of coping and problem-focused coping [12,17]. It is vitally important that health professionals evaluate the resilience-related status of their patients to use this factor to facilitate the development of a problem-focused strategy, if necessary.

There are some limitations of the present study. As this study used a cross-sectional design, the results do not clarify the direction of causality within the relationships among coping strategy, resilience, and demographic characteristics. Moreover, patients were recruited from a teaching hospital only, which consisted of a convenience sample of patients with brain tumor, which may further limit the generalizability of the findings to other population.

Conclusion

The present study supports the view that resilience significantly improves problem-focused coping strategy and total coping strategy of patients. This result presents empirical evidences to assist health professionals to adapt appropriate approaches to support individuals' coping strategy. This result supports that resilience contributes to coping strategies in patients with brain tumor. Interventions to enhance resilience have been suggested as an effective approach to help patients' stressful experience [14]. Resilience can provide a basis for possibly valuable intervention to strengthen patients' problem coping strategies. Enhancing resilience may strengthen the coping strategy of patients suffering from brain tumors. For nursing practice, health team members should target strategies that increase the resilience of their patients to enhance the efficacy of their problem-focused coping and total coping strategy. For further research, it is necessary to clarify the particular relationship between resilience and patients' emotional focused coping, mainly the role of resilience in an unchangeable stress situation. Integrating a theoretical model of resilience in nursing education may assist students and health professionals to possess the knowledge and practice to train the resilience of patients and benefit the outcome of patient care.

Conflict of interest

There is no conflicting interest declared.

References

- Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. *Ca - Cancer J Clin*. 2019;69(1):7–34. <https://doi.org/10.3322/caac.21551>
- Armstrong TS, Vera-Bolanos E, Acquaye AA, Gilbert MR, Ladha H, Mendoza T. The symptom burden of primary brain tumors: evidence for a core set of

- tumor- and treatment-related symptoms. *Neuro Oncol*. 2016;18(2):252–60. <https://doi.org/10.1093/neuonc/nov166>
- Sutton K. The impact on quality of life for people with brain tumours of entering a research trial involving new anti-cancer agents. *Eur J Oncol Nurs*. 2013;17(4):396–401. <https://doi.org/10.1016/j.ejon.2012.12.003>
- Palese A, Cecconi M, Moreale R, Skrap M. Pre-operative stress, anxiety, depression and coping strategies adopted by patients experiencing their first or recurrent brain neoplasm: an explorative study. *Stress Health*. 2012;28(5):416–25. <https://doi.org/10.1002/smi.2472>
- Goebel S, Mederer D, Mehdorn HM. Surgery-related coping in surgery patients with intracranial tumors. *World Neurosurg*. 2018;116:e775–82. <https://doi.org/10.1016/j.wneu.2018.05.091>
- Master SL, Amodio DM, Stanton AL, Yee CM, Hilmert CJ, Taylor SE. Neurobiological correlates of coping through emotional approach. *Brain Behav Immun*. 2009;23(1):27–35. <https://doi.org/10.1016/j.bbi.2008.04.007>
- Edvardsson T, Ahlström G. Illness-related problems and coping among persons with low-grade glioma. *Psychooncology*. 2005;14(9):728–37. <https://doi.org/10.1002/pon.898>
- Lazarus RS, Folkman S. *Stress, appraisal and coping*. New York: Springer; 1984.
- Folkman S, Lazarus RS, Dunkel-Schetter C, DeLongis A, Gruen RJ. Dynamics of stressful encounters: cognitive appraisal, coping and encounter outcomes. *J Pers Soc Psychol*. 1986;50(5):992–1003. <https://doi.org/10.1037/0022-3514.50.5.992>
- Edward KL. Chronic illness and wellbeing: using nursing practice to foster resilience as resistance. *Br J Nurs*. 2013;22(13):741–6. <https://doi.org/10.12968/bjon.2013.22.13.741>
- Rice V, Liu B. Personal resilience and coping with implications for work. Part I: a review. *Work*. 2016;54(2):325–33. <https://doi.org/10.3233/WOR-162300>
- Kang J, Suh EE. The influence of stress, spousal support, and resilience on the ways of coping among women with breast cancer. *Asian Oncol Nurs*. 2015;15(1):1–8. <https://doi.org/10.5388/aon.2015.15.1.1>
- Luo D, Lin Z, Shang XC, Li S. "I can fight it!": a qualitative study of resilience in people with inflammatory bowel disease. *Int J Nurs Sci*. 2019;6(2):127–33. <https://doi.org/10.1016/j.ijnss.2018.12.008>
- Loprinzi CE, Prasad K, Schroeder DR, Sood A. Stress management and resilience training (SMART) program to decrease stress and enhance resilience among breast cancer survivors: a pilot randomized clinical trial. *Clin Breast Cancer*. 2011;11(6):364–8. <https://doi.org/10.1016/j.clbc.2011.06.008>
- Dubey C, De Maria J, Hoeppli C, Betticher DC, Eicher M. Resilience and unmet supportive care needs in patients with cancer during early treatment: a descriptive study. *Eur J Oncol Nurs*. 2015;19(5):582–8. <https://doi.org/10.1016/j.ejon.2015.03.004>
- Satici SA. Psychological vulnerability, resilience, and subjective well-being: the mediating role of hope. *Pers Indiv Differ*. 2016;102:68–73. <https://doi.org/10.1016/j.paid.2016.06.057>
- Dreier LE, Cox MK, McBrayer A, Neumeier WH, Herman C, Malone LA. Resilience among caregivers of injured service members: finding the strengths in caregiving. *Arch Phys Med Rehabil*. 2019;100(4S):S76–84. <https://doi.org/10.1016/j.apmr.2018.12.027>
- Popa-Velea O, Diaconescu L, Jidveian Popescu M, Trușescu C. Resilience and active coping style: effects on the self-reported quality of life in cancer patients. *Int J Psychiatr Med*. 2017;52(2):124–36. <https://doi.org/10.1177/0091217417720895>
- Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program of the social, behavioral, and biomedical sciences. *Behav Res Methods*. 2007;39(2):175–91. <https://doi.org/10.3758/bf03193146>
- Karnofsky DA, Abelmann WH, Craver LF, Burchenal JH. The use of the nitrogen mustards in the palliative treatment of carcinoma. *Cancer*. 1978;1(4):634–56. [https://doi.org/10.1002/1097-0142\(194811\)1:4<634::AID-CNCR2820010410>3.0.CO;2-L](https://doi.org/10.1002/1097-0142(194811)1:4<634::AID-CNCR2820010410>3.0.CO;2-L)
- Pan CJ, Liu HC, Liang SY, Liu CY, Wu WW, Cheng SF. Resilience and coping strategies influencing the quality of life in patients with brain tumor. *Clin Nurs Res*. 2019;28(1):107–24. <https://doi.org/10.1177/1054773817714562>
- Lee HF, Liang SY. Factors influencing resilience in primary brain tumor patients. *Clin Oncol Res*. 2018;1(2):1–6. <https://doi.org/10.31487/j.COR.2018.02.003>
- Sheu S. Uncertainty and anxiety in patients with initial attack of myocardial infarction: the effect of coping methods. *Hu Li Yan Jiu*. 2001;9(2):159–71. Chinese.
- Vitaliano PP, Russo J, Carr JE, Maiuro RD, Becker J. The ways of coping checklist: revision and psychometric properties. *Multivariate Behav Res*. 1985;20(1):3–26. https://doi.org/10.1207/s15327906mbr2001_1
- Wagnild GM, Young HM. Development and psychometric evaluation of the resilience scale. *J Nurs Meas*. 1993;1(2):165–78.
- Yang HL. *Depressive symptoms, self-esteem, resilience and related factors among older adults with cancer*. Taipei: Taipei Medical University; 2009. Chinese.
- Wu WW, Tsai SY, Liang SY, Liu CY, Jou ST, Berry DL. The mediating role of resilience on quality of life and cancer symptom distress in adolescent patients with cancer. *J Pediatr Oncol Nurs*. 2015;32(5):304–13. <https://doi.org/10.1177/1043454214563758>
- Rosenberg AR, Syrjala KL, Martin PJ, Flowers ME, Carpenter PA, Salit RB, et al. Resilience, health, and quality of life among long-term survivors of hematopoietic cell transplantation. *Cancer*. 2015;121(23):4250–7. <https://doi.org/10.1002/cncr.29651>
- Yahaya NA, Subramanian P, Bustam AZ, Taib NA. Symptom experiences and coping strategies among multi-ethnic solid tumor patients undergoing

- chemotherapy in Malaysia. *Asian Pac J Cancer Prev*. 2015;16(2):723–30. <https://doi.org/10.7314/apjcp.2015.16.2.723>
30. Gurkan A, Pakyuz SÇ, Demir T. Stress coping strategies in hemodialysis and kidney transplant patients. *Transplant Proc*. 2015;47(5):1392–7. <https://doi.org/10.1016/j.transproceed.2015.05.022>
 31. Han Y, Hu D, Liu Y, Lu C, Luo Z, Zhao J, et al. Coping styles and social support among depressed Chinese family caregivers of patients with esophageal cancer. *Eur J Oncol Nurs*. 2014;18(6):571–7. <https://doi.org/10.1016/j.ejon.2014.07.002>
 32. Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. *J Pers Soc Psychol*. 1989;56(2):267–83. <https://doi.org/10.1037//0022-3514.56.2.267>
 33. Campbell-Sills L, Cohan SL, Stein MB. Relationship of resilience to personality, coping, and psychiatric symptoms in young adults. *Behav Res Ther*. 2006;44(4):585–99. <https://doi.org/10.1016/j.brat.2005.05.001>
 34. Lai HL, Hung CM, Chen CI, Shih ML, Huang CY. Resilience and coping styles as predictors of health outcomes in breast cancer patients: a structural equation modelling analysis. *Eur J Oncol Nurs*. 2020;29(1):e13161. <https://doi.org/10.1111/ecc.13161>
 35. Li C, Lu H, Qin W, Li X, Yu J, Fang F. Resilience and its predictors among Chinese liver cancer patients undergoing transarterial chemoembolization. *Canc Nurs*. 2019;42(5):E1–9. <https://doi.org/10.1097/NCC.0000000000000640>