

Self-Efficacy Mediates The Relationship Between Social Support And Psychological Resilience In Patients With Lung Cancer: A Cross-Sectional Study

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Research Article

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Abstract

Purpose: The prognosis of patients with lung cancer might be influenced by mental health. Psychological resilience is one of the important indicators to reflect the psychological state. It has been shown that patients with higher social support and self-efficacy have better psychological resilience. The aim of this study was to determine whether or not self-efficacy mediates the relationship between social support and psychological resilience in patients with lung cancer.

Methods: A cross-sectional study of 303 lung cancer patients was conducted. Participants completed questionnaires, including the Chinese version of the Perceived Social Support Scale, the Chinese version of Strategies Used by People to Promote Health Scale, and the Chinese version of the Connor-Davidson Resilience Scale.

Results: Mediation analysis indicated that self-efficacy had a partially mediating effect between social support and psychological resilience. Direct paths from social support to self-efficacy, self-efficacy to psychological resilience, and social support to psychological resilience were significant ($p < 0.001$). Moreover, indirect paths from social support to self-efficacy and self-efficacy to psychological resilience were also significant at the 95% level [0.120–0.550]; the mediating effect accounted for 38.16% of the total effect.

Conclusions: Self-efficacy plays an important role in the relationships between social support and psychological resilience in cancer patients. Social support not only directly influenced the psychological resilience, but also indirectly influenced psychological resilience through self-efficacy.

Introduction

The incidence and mortality of lung cancer is at the forefront of the tumor and shows a rising trend. Lung cancer makes patients to develop a variety of negative emotions during the process of the illness easily, while the adverse psychological state of cancer patients causes many negative effects, such as affecting the quality of life and reducing compliance with treatment and satisfaction[1]. These conditions will easily lead to an adverse prognosis. Therefore, improving the psychological state of lung cancer patients is a major focus of current research.

Compared with most cancer patients, there are still a number of patients having maintained levels of psychological well-being[2]. Consol et al. had established that this positive psychological response in cancer patients could be attributed to a high level of psychological resilience[3]. Psychological resilience is defined by the American Psychology Association as “when still have a good adaptation process,” which means the ability to rebound against difficult experiences[4]. Moreover, the trend in the cancer care field has extended to explore the positive resources, psychological resilience has gradually become an essential research topic in cancer patients[5].

After systematic reviewing 52 studies, Stewart et al. pointed out that psychological resilience had a role in promoting the rehabilitation and prognosis of cancer patients[6]. Seiler et al. found that the physiological basis of psychological resilience was the plasticity of the “reward and fear circuit,” for cancer patients, which meant that, psychological resilience could be learned, otherwise it could be modified through some psychological and pharmacologic interventions[7]. Cancer patients with higher psychological resilience tend to have a better mental and physical state. Therefore, for cancer patients, it is very important to explore the path of psychological resilience, which can greatly help enhance their mental health.

The Kumpfer Resilience Framework (KRF) is the model that is often used to describe paths to enhance or diminish the level of psychological resilience[8]. The KRF indicates when individuals face stresses or challenges, their external factors (including family, culture, community, school, and peers) have an interaction with internal factors (including cognitive, emotional, spiritual, physical, and behavioral factors), which raise the changes of their psychological resilience. Risk and protective factors are vital elements of psychological resilience. It has been pointed out that upgrading the protective factors of patients effectively increases the level of psychological resilience and improves disease prognosis to certain degree extent[9]. Ye et al. reported that an increasing number of studies had used the KRF to guide changes in the psychological resilience of cancer patients[5]. In this study, lung cancer is regarded as a source of stress or challenge; self-efficacy is considered to be an internal factor of psychological resilience; and social support is defined as an external protective factor. Perhaps the changes in psychological resilience among cancer patients can be explained.

Self-efficacy refers to the belief that individuals can produce desired outcomes as a result of their own actions using skills and capabilities, and provide confidence that patients can manage the events that affect their lives[10]. After conducting a cross-sectional survey in 182 cancer survivors, Foster et al. stated that self-efficacy effectively predicted health-related behavior in cancer patients[11]. Moreover, self-efficacy was positively correlated with the quality of life of cancer patients and the ability to regulate their disease[12-13]. In summary, self-efficacy is significant for disease management in cancer patients. In addition, Tamura et al. searched articles published from 2014 to 2019

to conduct a systematic literature review[14]. It was reported that self-efficacy was one kind of internal factors, which was related to psychological resilience in cancer patients. Moreover, Schwarzer et al. theorized that self-efficacy could promote psychological resilience[15]. Wu et al. surveyed 253 patients with gastric cancer and reported that self-efficacy was supposed to be positively associated with psychological resilience[16].

Social support refers to the assistance that is provided by family, friends, and others. Social support reflects the perception that one is loved, esteemed, and valued by other people[17]. It has been reported that social support is a vital situational resource that can 1) improve health and fulfill physical and emotional needs for cancer patients, 2) enhance well-being and reduce distress in considerable amount of cancer patients, 3) and be an important factor in optimizing the quality of life of cancer patients[18]. Social support might increase psychological resilience in cancer patients. A systematic review of palliative patients with advanced cancer published in 2021 showed social support might be one of the most important protective factors of psychological resilience in patients who experience stressful events[19]. Celik et al. conducted a cross-sectional survey among 128 patients with breast cancer and found that social support was positively associated with psychological resilience[20]. Additionally, it may be inferred that social support facilitates self-efficacy in cancer patients. A cross-sectional study conducted from 2018 to 2019 showed the patients with breast cancer seemed to have higher self-efficacy[21]. Besides, Anna et al. surveyed 102 patients with the initial onset of non-small cell lung cancer and demonstrated that social support was positively correlated with self-efficacy[22].

Regarding the relationship of the above three variables, social support was positively associated with self-efficacy and positively correlated with psychological resilience, and self-efficacy was positively associated with psychological resilience[16, 20, 22]. According to the KRF, self-efficacy as one kind of internal factors leads to advancing psychological resilience, and social support as one kind of external factors increases the individual's self-efficacy and psychological resilience. It might be inferred self-efficacy might likely act as a mediator in the relationship between social support and psychological resilience in patients with lung cancer.

Previous studies of psychological resilience in patients with lung cancer have focused on exploring its related factors, without concentration on relationship among those factors. Few studies have deeply investigated the relationship among social support, self-efficacy, and psychological resilience in patients with lung cancer. Considering to provide a theoretical basis for enhancing the psychological resilience in patients with lung cancer in the future, it is meaningful to examine the relationship among those three variables. Therefore, This study aimed to investigate the relationship among social support, self-efficacy, and psychological resilience in patients with lung cancer. We hypothesized that self-efficacy had mediating effect between social support and psychological resilience.

Methods

Participants and procedure

Participants were recruited from four tertiary hospitals in Hunan Province, China through simple random sampling, between November 2016 and November 2017. The inclusion criteria were as follows: (1) diagnosed with lung cancer, (2) received relevant treatment and stayed in the hospital, (3) age > 18 years, (4) conscious and able to accurately indicate their wishes. The exclusion criteria were as follows: (1) with a history of mental illness and severe cognitive impairment, (2) with other types of cancer or serious life-threatening diseases, (3) involved in other related research.

This study was approved by the Institutional Review Board at the Central South University (**approval number**: 2016038). Before participating in the study, each volunteer was informed and consent was obtained. Then, the questionnaires were distributed by two trained research assistants. A total of 320 questionnaires were distributed; 303 copies of the questionnaire were recovered.

Measures

Demographic and clinical information

The characteristics of lung cancer patients were investigated using a self-compiled questionnaire that included age, sex, education level, monthly income, and pathological classification.

Perceived social support scale (PSSS)

The scale was developed by Zimet[23]. The PSSS consisted of 12 items and three subscales (family, friends, and significant others). The PSSS scale is a 7-point scale ranging from 1–7, where 1 stands for “never” and 7 stands for “strongly agree.” The total score is the sum of

the items. The higher the score, the more the individual can perceive social support. It has been shown that the Chinese version of the PSSS has good reliability[20]. In this study, the Cronbach's α coefficient of the total amount was 0.915.

Strategies used by people to promote health (SUPPH)

The SUPPH scale was developed by Lev and consisted of 29 items and three subscales (positive attitude, stress reduction, and making decisions)[24]. The SUPPH scale is a 5-point scale (1–5 points, where 1 stands for “no confidence” and 5 stands for “very confident.” The total score is the sum of the items. The higher the score, the higher the self-efficacy of the cancer patients. Yuan concluded that the Chinese version of the SUPPH scale measures Chinese adult cancer patients' self-efficacy effectively[25]. In the present study, the Cronbach's α coefficient of the total scale was 0.971.

Connor-Davidson resilience scale in the Chinese version (CD-RISC)

The scale was developed by Davidson and includes 25 items with three subscales (tenacity, strength, and optimism). Each item is rated on a 5-point scale (0–4, where 0 stands for “not true at all” and 4 stands for “true nearly all the time.” The total score is the sum of the items. The higher total score represents a higher level of psychological resilience. The Chinese version of the CD-RISC scale has good reliability and validity, and at the present, this version has been widely used in adolescents, military students, and adults[26]. The Cronbach's α coefficient of the total scale in this study was 0.937.

Statistical analysis

Data were entered and analyzed with SPSS version 18.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics were used to analyze participant status. ANOVA, independent sample t -tests, and Kruskal-Wallis H tests were used to analyze the significance of demographic differences among variable scores and determine the covariates. Pearson's correlation analysis was used to analyze the relationship among variable scores. Multiple regression analysis was used to control the covariates to determine if self-efficacy could be a mediator. Then, the structural equations model was established by AMOS 17.0 (IBM Corporation, Armonk, NY, USA) to examine the fit of the hypothesized structural model. The mediating effect of self-efficacy was further verified by the bootstrap method. The inspection level was set at 0.05.

Results

Sample characteristics

A total of 303 qualified individuals agreed to participate in this study. Slightly more than one-half of the participants were male (64.7%), and the average age of the patients was 56.74 ± 10.93 years (range, 21-89 years). More than one-half of the patients had a junior middle school education or beyond (70.3%). The majority of the patients earned < 3000 Yuan per month (72.9%). The most common type of lung cancer was adenocarcinoma (38.3%). All participants were currently receiving cancer treatment (Table 1).

The demographic differences among social support, self-efficacy, and psychological resilience

The level of social support differed significantly by the education level ($\chi^2=15.73, p=0.001$). The self-efficacy status differed by the education level ($F=6.81, p=0.000$) and monthly income ($F=4.94, p=0.008$). The level of psychological resilience differed significantly by sex ($t=2.36, p=0.019$), education level ($F=13.81, p=0.000$), monthly income ($F=11.99, p=0.000$), and pathological classification ($F=2.62, p=0.035$) (Table 1).

Table 1 Sample characteristics and demographic differences among variable scores											
		N (%)	CD-RISC			SUPPH			PSSS		
			Mean (SD)	t/F	<i>P</i>	Mean (SD)	t/F	<i>P</i>	Mean (SD)	t/F	<i>P</i>
Sex	Male	196 (64.7)	51.53 (15.02)	2.36	0.019*	91.84 (22.04)	1.79	0.074	61.58 (9.81)	1.45	0.149
	Female	107 (35.3)	47.23 (15.35)			87.04 (22.80)			59.79 (11.10)		
Age(Year)	≤30	4 (1.3)	48.50 (13.23)	0.05	0.996	72.25 (16.98)	1.49	0.207	50.50 (7.94)	0.74	0.562
	30-39	15 (5.0)	51.33 (12.21)			93.80 (24.11)			58.33 (13.40)		
	40-49	46 (15.2)	50.09 (15.87)			89.70 (22.81)			60.43 (10.76)		
	50-59	107 (35.3)	49.78 (15.30)			90.40 (22.74)			61.01 (10.43)		
	≥60	131 (43.2)	50.07 (15.55)			90.23 (21.96)			61.70 (9.60)		
Education Level	Elementary school	90 (29.7)	45.91 (13.31)	13.81	0.000*	83.29 (20.88)	6.81	0.000*	58.64 (9.43)	15.73(a)	0.001*
	Junior middle school	105 (34.6)	46.45 (14.03)			89.01 (22.87)			60.37 (10.31)		
	Senior high school	76 (25.1)	55.37 (16.64)			95.88 (22.12)			64.83 (9.18)		
	College/ University	32 (10.6)	60.50 (12.26)			99.53 (19.56)			60.13 (12.78)		
Monthly Income (Yuan)	<3000	221 (72.9)	47.5 (14.59)	11.99	0.000*	88.01 (22.04)	4.94	0.008*	60.73 (10.18)	0.20	0.817
	3000-4999	59 (19.5)	56.22 (12.53)			93.64 (21.98)			61.39 (10.28)		
	≥5000	23 (7.6)	58.17 (20.33)			101.74 (23.05)			61.91 (11.76)		
Pathological Classification	Squamous carcinoma	98 (32.3)	53.47 (15.13)	2.62	0.035*	91.48 (21.49)	0.65	0.629	61.36 (10.06)	1.90	0.111
	Adenocarcinoma	116 (38.3)	48.52 (14.70)			88.93 (21.36)			61.41 (9.83)		
	Small cell carcinoma	27 (8.9)	44.85 (14.13)			83.93 (20.90)			59.40 (10.30)		
	Other carcinoma	27	47.41			99.26			58.48		

	(8.9)	(14.43)	(26.48)	(11.70)
Unsure	35	51.26	88.20	61.37
	(11.6)	(15.25)	(24.75)	(11.51)

“a” refers to the use of nonparametric test(Kruskal-Wallis H test), take its $X^2_{(2)}$ * $P < 0.05$

The relationships among social support, self-efficacy, and psychological resilience

The mean (SD) of PSSS, SUPPH, and CD-RISC scores were 60.95 (10.30), 90.15 (22.39), and 50.01(15.25), respectively. Social support had a significant positive correlation with self-efficacy ($r = .274, p < 0.001$) and psychological resilience ($r = .363, p < 0.001$), while self-efficacy had a significant positive correlation with psychological resilience ($r = .599, p < 0.001$).

Mediating role of self-efficacy

Sex, education level, monthly income, and pathological classification influenced one or all of the variables. Therefore, these demographic characteristics were selected as covariates. Multiple regression analysis was used to analyze the relationships among the three variables. After controlling the covariates, psychological resilience was designated as the dependent variable and social support was the independent variable in Equation 1. Self-efficacy was as the dependent variable and social support was the independent variable in Equation 2. Psychological resilience was as the dependent variable, and social support and self-efficacy were the independent variables in Equation 3. The results of this study showed that social support significantly predicted psychological resilience ($\beta = 0.240, p < 0.001$) and self-efficacy in lung cancer patients ($\beta = 0.316, p < 0.001$). When social support and self-efficacy simultaneously predicted psychological resilience, the predictive effects of social support and self-efficacy were both significant ($\beta = 0.199, p < 0.001, \beta = 0.487, p < 0.001$) (Table 2).

	Dependent variable	Independent variable	Regression coefficients(β)	<i>t</i>	F	Adjusted R^2
Equation 1	Psychological resilience	Sex	-0.064	-1.173	9.304	0.121***
		Education Level	0.176	3.041		
		Monthly Income	0.106	1.847		
		Pathological Classification	0.023	0.429		
		Social support	0.240	4.380		
Equation 2	Self-efficacy	Sex	-0.077	-1.514	18.963	0.242***
		Education Level	0.213	3.394		
		Monthly Income	0.169	3.141		
		Pathological Classification	-0.047	-0.928		
		Social support	0.316	6.169		
Equation 3	psychological resilience	Sex	-0.046	-1.054		
		Education Level	0.128	2.708		
		Monthly Income	0.117	2.534		
		Pathological Classification	-0.058	-1.345		
		Social support	0.199	4.407		
		Self-efficacy	0.487	10.474		

***: indicates $P < 0.001$

Structural equation model confirmed analysis

On the basis of regression analysis, the mediation function was needed to establish a structural equation model. AMOS 17.0 was used to draw the path map and test the mediating effect (Fig. 1). The results of the model fit were as follows: χ^2/df (Normed chi-square) = 1.856, Goodness-of-Fit Index (GFI) = 0.972, Adjusted Goodness-of-Fit Index (AGFI) = 0.941, Normed Fit Index (NFI) = 0.979, Incremental Fit Index (IFI) = 0.990, Tucker-Lewis Index (TLI) = 0.983; Comparative Fit Index (CFI) = 0.990, and Root Mean Square Error of Approximation (RMSEA) = 0.053. The bootstrap method was used to further verify the mediating effect. The bootstrap method was used to estimate the confidence interval. The study was repeated a total of 5000 times. The total, direct, and indirect effects of each path are shown in Table 3. In addition, the 95% confidence interval was between 0.120 and 0.550 and did not contain 0, which confirmed that the mediating effect of self-efficacy was established. The mediating effect was 0.137.

Table 3 Bootstrap analysis of mediating effect					
Effect	Path	Effect value	Effect amount	95% Confidence Interval	
				Upper limit	Lower limit
Direct effect	Social support → psychological resilience	0.222	61.84%	0.816	0.224
Direct effect	Social support → self-efficacy	0.245		0.264	0.067
Direct effect	Self-efficacy → psychological resilience	0.560		2.393	1.404
Mediating effect	Social support → self-efficacy → psychological resilience	0.137	38.16%	0.550	0.120
Total effect		0.359			
*Bootstrap sample size =5000					

Discussion

This study aimed to explore the role of self-efficacy in the relationship between social support and psychological resilience among patients with lung cancer. The results indicated that self-efficacy was positively correlated with social support and psychological resilience. Self-efficacy had a partial mediating role. The results partially supported our hypothesis.

The relationship between social support, self-efficacy and psychological resilience

The direct relationship between social support and psychological resilience of this study was similar to the finding of Kim, who reported a positive relationship between social support and psychological resilience in patients with gastrointestinal cancer[27]. Individuals with high social support scores would predict higher levels of psychological resilience. A cozy family atmosphere and marriage relationships could provide patients with more physical and emotional support, making them more optimistic, thus increasing the level of psychological resilience[28]. Moreover, higher social support was associated with the ability of perceiving stress[29]. Good social support might be an important guarantee for psychological resilience, it could eliminate patients' psychological barriers, which could be beneficial to their mental health. Therefore, clinical medical professionals and their family members should pay attention to the emotional state of patients with lung cancer and spend more time accompanying the patients to enhance their subjective support feelings to improve the psychological resilience of patients and relieve the psychological pressure caused by the disease.

The results of this study indicated that self-efficacy had a significant positive predictive effect on psychological resilience. Yang et al. also reported similar research results that self-efficacy predicts psychological resilience prospectively[30]. It was reported that self-efficacy may be an important modifiable intrinsic factor for promoting psychological resilience[31]. Patients with high self-efficacy would have stronger confidence to conquer the illness which may help them effectively regulate negative emotions, make their attitudes become positive, and be willing to cooperate with the treatment. Thus, the level of psychological resilience is improved correspondingly. In addition, when patients with high self-efficacy can improve their disease symptoms by medication compliance, they could form a good cognitive evaluation system, which might encourage them to deal with difficulties and pressures actively and reduce anxiety, so that their psychological resilience would be further enhanced. Therefore, it is essential to take some positive strategies to enhance patient self-efficacy.

Mediating role of self-efficacy

The results in this study showed that self-efficacy played a part mediating roles between social support and psychological resilience. Social support had a positive predictive effect on self-efficacy and indirectly predicted the level of psychological resilience by self-efficacy, which is consistent with the finding of Wang, who reported similar relationships among variables in 747 early career registered nurses[32].

Based on this study, social support and self-efficacy were both important for affecting the psychological state and behavioral changes in lung cancer patients. By reviewing the articles, we concluded that good social support is a key element to help patients establish and develop self-efficacy, better social support strengthens patient self-efficacy[22, 33]. More specifically, when facing difficulties during treatment, the patients with powerful external support would gain enough encouragement. Verbal persuasion is the one component of self-efficacy that would effectively improve patient internal self-confidence and behavioral cognitive evaluation, so that they are no longer escaping or retreating, but actively responding. Verbal persuasion would promote the level of psychological resilience[10].

The ratio of the mediating effect-to-the total effect in this study was 38.16%, which indicated that there existed other factors contributing to the relationship between social support and psychological resilience. A recent study investigated Chinese adolescents and found that social support predicts psychological resilience, and that self-efficacy plays a partially mediating role in the relationship between social support and psychological resilience[34]. Other factors may also play an important role in the relationship between social support and psychological resilience, such as coping style and disease perception[7].

Conclusions

In summary, according to this study, there was a positive correlation between psychological resilience, social support, and self-efficacy. In addition, social support could not only directly influence psychological resilience of lung cancer patients, but also indirectly influenced psychological resilience through self-efficacy. Self-efficacy played a part mediating role between social support and psychological resilience. Therefore, in the future, in order to develop interventions for promoting the psychological resilience among lung cancer patients, these findings should be taken into consideration.

There were several limitations involving this research. First, the samples selected in this study were chosen from Hunan Province of China, which might have certain limitations and regional characteristics. In the future, the scope of the samples should be expanded and the regional characteristics verified. In addition, there were many factors affecting the psychological resilience of lung cancer patients, such as coping style and disease perception. This study only explored the relationship among social support, self-efficacy, and psychological resilience. Therefore, the influencing factors of psychological resilience could be increased and the path model could be constructed to analyze the impact of various factors on psychological resilience.

Declarations

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Availability of data and material The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. Relevant patient level data, a full dataset, and statistical analyses are available from the corresponding author (jpzhang1965@csu.edu.cn) upon reasonable request.

Code availability Not applicable.

Authors' contributions All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Yizhen Yin and Jie Zhang. The first draft of the manuscript was written by Yizhen Yin, and all authors commented on the previous versions of the manuscript. All authors read and approved the final manuscript.

Ethics approval Institutional Review Board at the Central South University (approval number: 2016038) approved this study.

Consent to participate Informed consent was obtained from all participants included in the study.

Consent for publication Written informed consent for publication was obtained from all participants.

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Figures

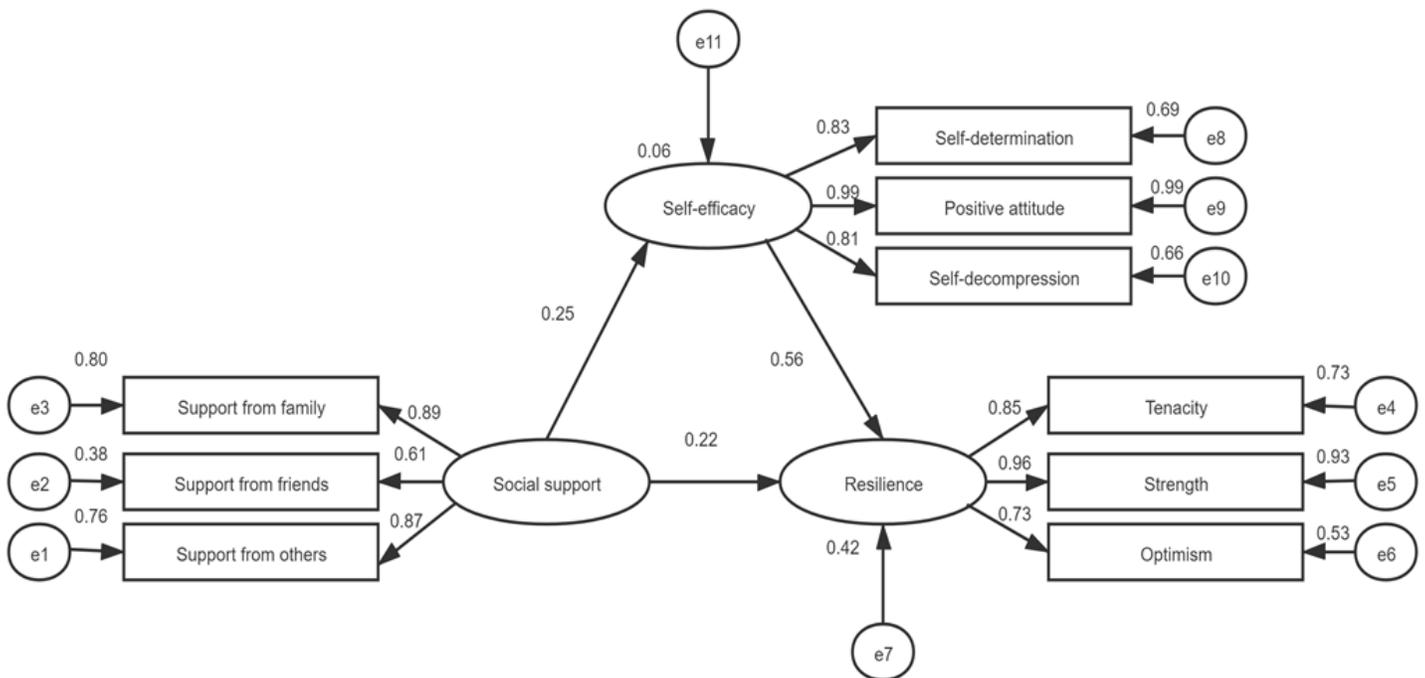


Figure 1

The structural equation model on the relationship among social support, self-efficacy, and psychological resilience. e1–e6, e8–e10 the measurement error of each observed variable to estimate latent variables; e7, e11 the residual that may affect the endogenous latent variables except the exogenous latent variables ability.