

Path analysis of the effects of social support, self-efficacy, and coping style on psychological stress in children with malignant tumor during treatment

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Abstract

The aim of this study was to explore the relationship between social support, self-efficacy, coping style, and psychological stress in children with malignant tumors during the treatment, and to clarify the mediating effects.

From May 2019 to August 2019, selected by convenience sampling method, 141 children with malignant tumors in the treatment period were evaluated using the Social Support Questionnaire, General Self-efficacy Scale, Simplified Coping Style Questionnaire, and Depression-Anxiety-Stress Scale.

The results of correlation analysis showed that depression was negatively correlated with coping style, self-efficacy, affirmation and support, satisfaction, company, and intimacy, but positively correlated with conflict and punishment; both anxiety and stress were significantly negatively correlated with coping style, self-efficacy, affirmation and support, company, and intimacy. The results of the model indicated that gender, social support, self-efficacy, and coping style could directly predict the psychological stress of children with malignant tumors in the treatment period, social support and self-efficacy could indirectly predict the psychological stress of children with malignant tumors, and the total effect of self-efficacy on the psychological stress of children was the largest. Through 2000 bootstrap tests of mediating effect, it not only confirmed the mediating effect of self-efficacy and coping style but also had a chain-mediating effect.

Appropriate social support can improve the self-efficacy of children with malignant tumors in the treatment period and encourage them to take a positive response to the disease, thereby effectively preventing or reducing the occurrence of psychological stress.

Abbreviations: CI = confidence interval, GFI = Goodness-of-Fit Index, NFI = Normed Fit Index, RMSEA = Root Mean Square Error of Approximation.

Keywords: children with malignant tumor, coping style, psychological stress, self-efficacy, social support

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1. Introduction

Psychological stress is thought to occur when individuals experience extreme emotional strain that exceeds their ability to cope and is able to cause physiological and psychological effects, such as insomnia, depression, anxiety, and tension.^[1] Children is a special period of growth and development for everyone especially those with malignant tumors. In the treatment process, the side effects and invasive examination, such as lipotrichia, bone marrow puncture, and lumbar puncture, can easily affect children's growth and cognitive development and may even lead to obvious psychological stress, including the idea to commit suicide.^[2-4] Suicide survivors encounter the same emotions as anyone who mourns the death of a significant other. However, they also experience a unique set of painful feelings in addition to their grief, such as guilt and anger, as well as the stigma associated with suicide.^[5] Thus, it is important to know the level of psychological stress in children with malignant tumors and make intervention for suicide prevention in time.

Social support is that people get help and support from family, friends, and leaders in social interaction activities, including actual material objective support, emotional subjective support, and the utilization of support,^[6] which has a positive impact on psychological stress.^[7,8] As the core concept of social cognitive theory put forward by Bandura, self-efficacy reflects the belief that individuals can take appropriate actions to face environmental challenges, and also show the ability of individuals to resist pressure on various issues in life.^[9] Studies at home and

abroad have confirmed that a high level of self-efficacy is conducive for patients to take a positive coping style,^[10] reduce the possibility of psychological stress,^[11] and contribute to mental health.^[12] Coping style, an important intermediary factor in the process of alleviating psychological stress, refers to the cognitive and behavioral style adopted by individuals when facing setbacks and pressures.^[13] Some studies have shown that positive coping style is the protective factor of psychological stress,^[14,15] and negative coping is related to psychological stress such as anxiety and depression.^[16] Besides, self-efficacy played a partial intermediary role between social support and positive coping style.^[17]

Some studies have confirmed that environmental and socio-economic factors are partly responsible for the development and prognosis of cancer, which has encouraged researchers to investigate the effect of psychological factors.^[18] According to Straub and Cutolo,^[19] psychological stress such as anxiety and depression may affect the tumor microenvironment, which may alter disease prognosis. Therefore, it is helpful to prevent the occurrence of psychological stress and change the prognosis of diseases by clarifying the factors of psychological stress and the interaction mechanism among various factors. At present, some researches have explored the factors of psychological stress. However, the published literature only reports the independent effects of gender, age, hospitalization days, family upbringing, and social support on psychological stress of children with malignant tumor.^[20–23] Most importantly, what kind of psychological mechanism among these variables affects psychological stress needs to be analyzed. Therefore, this study intends to construct a hypothetical model from the perspective of social support, self-efficacy and coping style (Fig. 1). With the assumption that gender, family upbringing, social support, self-efficacy, and coping style can directly affect the psychological stress of children with malignant tumors during treatment, and that social support can indirectly affect the psychological stress through the intermediary role of self-efficacy or coping style, this essay aims to further explore the psychological mechanism and provide a new perspective for preventing or reducing the occurrence of psychological stress.

2. Population and methods

2.1. Study participants

The study consecutively evaluated all children with malignant tumors in our hospital from May 2019 to August 2019, and all patients' parents or legal guardian provided written informed consent. In addition, the Ethics Committee of Children's Hospital of Chongqing Medical University approved this study.

The inclusion criteria were as follows: diagnosed with malignant tumors and began treatment, aged 8 to 18 years (children aged 8 years and above have the ability to self-report feelings),^[24] and had the ability to comprehend and communicate. The exclusion criteria were unable to understand the questionnaires, suffered from severe organic or mental diseases, and the recurrence of malignant tumors. One hundred forty-six eligible participants were invited to complete the questionnaires after they agreed to participate; however, 141 valid questionnaires were recovered and included in the analysis (missing data are not included in the study). A minimum ratio of sample size to estimate parameters was 5:1, but a more appropriate ratio was 10:1.^[25] Accordingly, the retained 141 subjects was a sufficient sample size to test our comprehensive model using structural equation modeling.

2.2. Data collection

The following data were collected:

- (1) Sociodemographic information: Age, gender, type of disease, and family upbringing.
- (2) Social support: Assessed using Social network questionnaire,^[26] which has a good reliability, and Cronbach alpha of each dimension is between 0.64 and 0.90. This scale can evaluate the relationship between child and parents, friends, teachers, etc, including 36 items describing 4 dimensions: affirmation and support, company and intimacy, satisfaction, conflict and punishment. Each item is scored from 1 (never) to 5 (almost), and the higher total score means the heavier degree of social support.

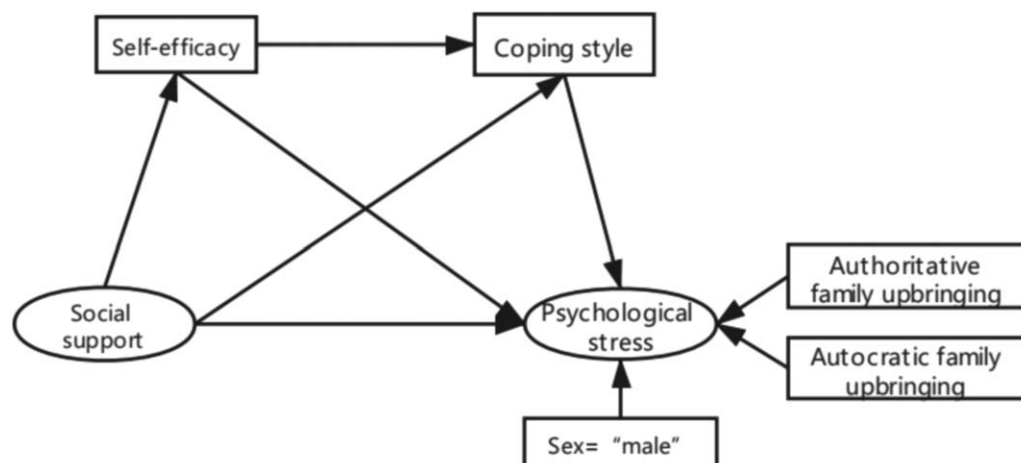


Figure 1. The theoretical model of psychological stress in children with malignant tumors.

Table 1
Sample characteristics (N = 141).

Characteristics	n (%)
Gender	
Boy	82 (58.16)
Girl	59 (41.84)
Age	
8~12 years old	95 (67.38)
13~18 years old	46 (32.62)
Type of disease	
Leukemia	89 (63.12)
Lymphoma	20 (14.18)
Sarcoma	14 (9.93)
Else	18 (12.77)
Family upbringing	
Authoritative	81 (57.45)
Autocratic	17 (12.06)
Doting	43 (30.50)

- (3) Self-efficacy: General self-efficacy was measured by the General Self-Efficacy Scale,^[27] which can reflect the individual's response to difficulties or setbacks. The Cronbach alpha of General Self-Efficacy Scale is 0.87, meaning good reliability. This scale has 10 items and each item is scored from 0 (quite wrong) to 3 (quite right). The total score ranges from 0 to 30 and higher total score indicates higher sense of self-efficacy. On the basis of the score index, the level of self-efficacy was divided into 3 grades: high (80% and above), medium (60~80%), and low (< 60%).
- (4) Coping Style: Measured using Simplified Coping Style Questionnaire^[28] with 20 items, which is a self-assessment scale to assess the attitudes or measures an individual might take to deal with life events. The Cronbach alpha is 0.90 and the scale has been widely used at home and abroad. The positive coping dimension is composed of items 1 to 12 and the negative coping dimension is composed of items 13 to 20. The total score for all 20 items ranges from 24 to 36. Coping style score is equal to positive coping score and negative coping score. If the value of coping style is greater than 0, the respondents mainly adopt positive coping style in stress state, while those less than 0 adopt more negative coping style.

- (5) Psychological stress: Depression-Anxiety-Stress Scale^[29] is a self-assessment scale to evaluate psychological stress. This scale has 21 items and the Cronbach alpha is 0.84. It has 3 dimensions and each dimension has 7 entries. A serious depression, anxiety, or stress can be achieved via the higher score.

2.3. Statistical analysis

Correlational analyses of social support, self-efficacy, coping style, and psychological stress were performed using Pearson correlations with SPSS version 22.0. All tests were 2-sided, and statistical significance was defined as $P < .05$. The structural equation model was conducted with AMOS version 22.0 for SPSS. Our model was based on 3 latent variables, social support, coping style, and psychological stress, and one observed variable, self-efficacy. We evaluated the model fit using the Chi-squared statistic with the normed Chi-square (χ^2/df), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), the Goodness-of-Fit Index (GFI), and the Normed Fit Index (NFI).

3. Results

3.1. Sample characteristics

Sample characteristics are presented in Table 1. One hundred forty-one children with malignant tumors participated in this study. The age range was from 8 years and 1 month to 16 years and 7 months, and 58.16% was boys.

3.2. Correlations

The descriptive statistics and correlations are provided in Table 2. Among psychological stress, the scores of depression dimension and stress dimension were 8.24 ± 5.44 and 9.99 ± 6.10 , respectively, which were in the normal range; the anxiety dimension was 8.67 ± 5.71 , with the average in the mild anxiety range. According to the results of correlation analysis, the severity of depression was negatively associated with coping style, self-efficacy, and some social support dimensions (affirmation and support, company and intimacy, satisfaction), but positively

Table 2
Mean, standard deviation (SD), and correlation between coping style, social support, self-efficacy, and psychological stress (N = 141).

Variable	Mean	SD	Correlations between variables											
			1	2	3	4	5	6	7	8	9			
1 Coping style	9.21	6.63	1											
Social support														
2 Affirmation and support	143.22	29.24	-.150	1										
3 Company and intimacy	99.62	21.22	-.065	.790 [†]	1									
4 Satisfaction	62.44	11.33	-.165	.634 [†]	.587 [†]	1								
5 Conflict and publishment	81.25	18.47	.163	-.520 [†]	-.568 [†]	-.576 [†]	1							
6 Self-efficacy	14.29	4.18	.496 [†]	.273 [†]	.307 [†]	.112	-.054	1						
Psychological stress														
7 Depress	8.24	5.44	-.272 [†]	-.331 [†]	-.360 [†]	-.213 [*]	.178 [*]	-.443 [†]	1					
8 Anxiety	8.67	5.71	-.395 [†]	-.176 [*]	-.199 [*]	-.114	.029	-.463 [†]	.650 [†]	1				
9 Stress	9.99	6.10	-.354 [†]	-.220 [†]	-.249 [†]	-.114	.104	-.413 [†]	.553 [†]	.662 [†]	1			

* $P < .05$.

† $P < .01$.

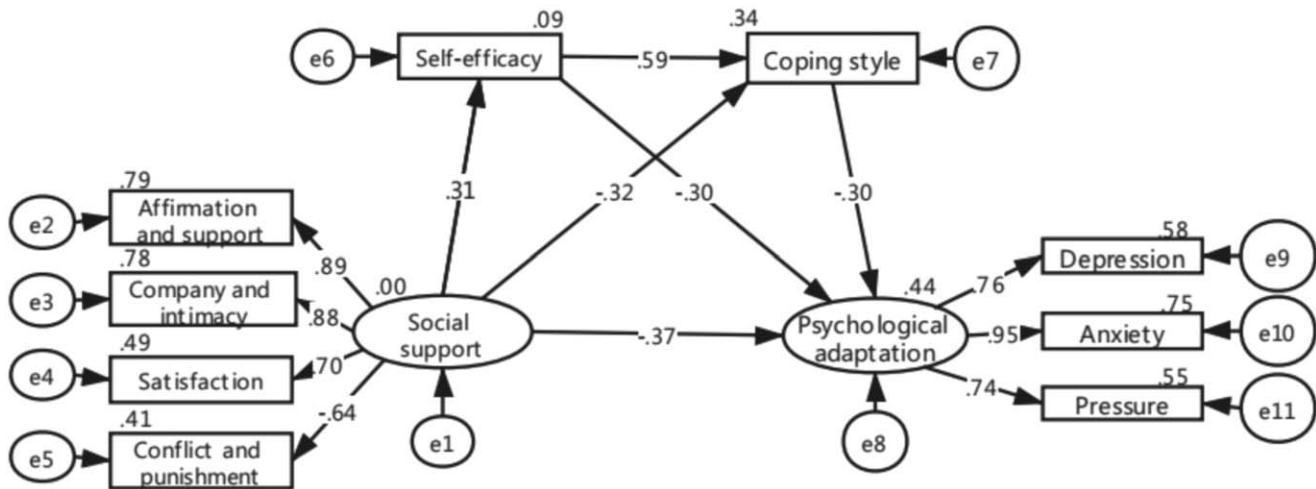


Figure 2. The final model of psychological stress with standardized regression coefficients.

correlated with conflict and punishment. Anxiety dimension and stress dimension were negatively correlated with coping style, self-efficacy, and 2 dimensions of social support (affirmation and support, companionship and intimacy).

3.3. Structural equation model

The results of factor analysis showed that Kaiser-Meyer-Olkin measure of sampling adequacy was 0.797 and Chi-square of Bartlett test was 580.441 ($P < .001$), which met the basic analysis conditions of the model. The structural equation model is illustrated in Figure 2. This model was adopted to assess the hypothesis model and showed good fit based on the Chi-squared statistic ($\chi^2/df = 1.467$) and had RMSEA = 0.058 (0.000~0.094), GFI = 0.943, CFI = 0.978, and NFI = 0.935. As expected, sex was not significantly associated with psychological stress ($P = .074$) and family upbringing was deleted because of its reduction for the model fit.

The standardized direct, indirect, and total effects of social support, self-efficacy, and coping style on psychological stress are summarized in Table 3. Direct negative predictors of children’s psychological stress included social support, self-efficacy, and coping style among which social support had the largest direct effect (-0.371). Moreover, social support could also indirectly and negatively influence psychological stress in children with malignant tumors through self-efficacy or coping style. Self-efficacy was an indirect predictor of the psychological stress through coping style, and the total effect of self-efficacy on the

psychological stress of children with malignant tumors in the treatment period was the largest.

In order to test the mediating effect of self-efficacy and coping style, 2000 bootstrap tests were conducted with Mplus8.3. According to Table 4, 95% confidence intervals (95% CIs) of the three mediating pathways of self-efficacy and coping style do not include/cross 0 and the indirect effects are within the 95% CIs, which indicates that the mediating effects are significant and there is a chain mediation. As social support could directly affect psychological stress with a significant pathway ($P < .01$), self-efficacy and coping style were partial mediators between social support and psychological stress.

4. Discussion

This study sought to determine the influence of social support, self-efficacy, and coping style on psychological stress among children suffering from malignant tumor. Our research explored this issue for the first time using a structural equation model, which highlighted the straightforward and non-straightforward relationships between these determinants and psychological stress. The model showed good fit with the data and confirmed our hypotheses, as follows: social support, self-efficacy, and coping style were direct influencing factors of the psychological stress in children with malignant tumors during treatment; and social support was indirectly associated with psychological stress via self-efficacy or coping style. Our findings provide several interesting results that could have implications for preventing or

Table 3
Standardized direct, indirect, and total effects of variables in the final model (N = 141).

Variables	Standardized direct effect	Standardized indirect effect	Standardized total effect
SS→PS	-0.371 [†]	-0.165	-0.421 [†]
SE→PS	-0.295 [†]	-0.298 [†]	-0.473 [†]
CS→PS	-0.299 [†]	—	-0.299 [†]

CS=Coping style, PS=psychological stress, SE=self-efficacy, SS=social support.

[†] $P < .01$.

Table 4
Bootstrap analysis of mediating effect (N = 141).

Pathways	Standardized indirect effect	95% confidence intervals	
		Lower limit	Upper limit
SS→SE→PS	-0.084 [†]	-0.175	-0.034
SS→CS→PS	0.096 [*]	0.029	0.236
SS→SE→CS→PS	-0.055 [*]	-0.134	-0.017

CS=coping style, PS=psychological stress, SE=self-efficacy, SS=social support.

^{*} $P < .05$.

[†] $P < .01$.

reducing the occurrence of the psychological stress in children with malignant tumors.

4.1. Social support and its influence on psychological stress

According to the results, for 8 to 18 years old Chinese children with malignant tumors in the treatment period, the overall social support level was relatively high. As an important feature, social support directly and indirectly affected psychological stress, which supported the findings of previous studies.^[30] In addition, the results of correlation analysis indicated that company and intimacy dimension of social support was the main influencing factor of psychological stress. The reason might lie in the fact that family members paid attention to the progress of the disease and always communicated with the child in a friendly way throughout the whole treatment process, which could alleviate the fear of unfamiliar environment and give the child confidence to overcome the disease. It can be seen that company and intimacy may be the protective factors of psychological stress in 8 to 18 years old children with malignant tumors during the treatment. Most of Chinese children are treated like little kids after being diagnosed with a malignant tumor, which may lead to bad psychological performance. For example, some parents help take care of everything and make their children excessively rely on families. The child may easily lose his or her temper if their parents are unwilling to provide help. Therefore, the clinical medical staff should guide the family members to provide enough care and company, frequently communicate with children, understand children's inner thoughts, and avoid the company and excessive doting of sole grandparents. Moreover, the process of children's growth cannot be separated from the interaction with their peers, so children with malignant tumors can be encouraged to make friends of the same age in the ward, and establish a long-term and effective support system for each other.

4.2. Self-efficacy and its influence on psychological stress

In this study, the average score of self-efficacy was 14.29 and lower than the median score of the scale. Children with low level of self-efficacy (score index < 60%) accounted for 76.60%, indicating that the self-efficacy level of 8 to 18 years old children with malignant tumors in China was low. On the basis of the model, self-efficacy could negatively predict the level of psychological stress in children, which was consistent with the results of similar studies at home and abroad.^[31-33] Correlation analysis showed that self-efficacy had the greatest effect on anxiety dimension ($r = -0.463$, $P < .01$). As for the reason, children with high self-efficacy level would face the negative event confidently, while those with low self-efficacy level were more afraid and anxious to face the disease as they tended to be pessimistic, passive, and less active. Consequently, in view of the children with low self-efficacy level, such as self-pity, procrastination, indecision, and not actively making friends, the medical staff can encourage them to exchange successful experiences with their peers who have high-level self-efficacy, and persuade them to believe that they have the confidence and ability to overcome difficulties and diseases, so as to improve their self-efficacy and help children deal with the negative event rationally.

4.3. Coping style and its influence on psychological stress

The structural equation model confirmed that coping style could negatively affect the level of psychological stress in 8 to 18 years

old children with malignant tumors during treatment. Lazarus and Folkman describe coping as a process in which persons use cognitive and behavioral efforts to manage stressful situations, and pressure will be generated if individuals think that the stimulation of stressful situations exceeds their coping ability.^[34] Therefore, the result of this research is not only in line with the view of Lazarus's and Folkman's Stress and Coping Theory, but also similar to the results of previous studies.^[35,36] Through correlation analysis, we found that coping style had the greatest impact on anxiety dimension ($r = -0.395$, $P < .01$), followed by stress dimension. Psychoanalysis School believes that the individuals will generate anxiety emotion when encountering stressful events without taking appropriate coping styles.^[37] Positive coping style helps improve the positive psychological level of individuals and promote children with malignant tumors to treat the disease from a positive perspective. On the contrary, the negative coping style, a kind of withdrawal psychology, is not able to help children find an effective way to solve the problem, leading to a higher anxiety level with the increase of hospitalization times and the emergence of treatment complications. Hence, the medical staff should pay attention to the coping styles of children with malignant tumors and their families, and help them understand the positive effects brought by the disease, such as making children cherish their lives more and getting closer to their families, etc. In addition, the department, together with social volunteers, can organize various activities in the ward to help children develop new literary hobbies, so as to prevent or reduce the psychological stress.

4.4. Partial mediation of self-efficacy and coping style

The well-fitting model showed that social support not only directly predicted the psychological stress of 8 to 18 years old children with malignant tumors during treatment, but also indirectly affected the psychological stress by improving the self-efficacy level or adopting positive coping styles. And bootstrap test confirmed that self-efficacy and coping style are partial mediating effects, that is, higher social support helps enhance the level of self-efficacy, so as to take a positive coping style to reduce the degree of psychological stress. The explanation may be that individuals with more social support believe that they can get necessary support and help when encountering difficulties or setbacks, so their confidence in their ability to solve problems continues to increase (i.e., the stronger self-efficacy). They are more inclined to adopt positive coping styles to face diseases, so as to avoid the occurrence of psychological stress. Specifically, the pathway (social support → coping style → psychological stress) showed that there was a significant negative correlation between social support and coping style, indicating that excessive social support would promote children to choose negative coping style, such as relying on others to solve problems. Therefore, the family members should control the social support provided to children, avoid excessive attention and support, and teach children to complete daily chores independently to increase successful experience. The medical staff can say some encouraging words to effectively enhance the self-efficacy of 8 to 18 years old children with malignant tumors during treatment and promote them to adopt positive coping styles, so as to prevent or reduce the occurrence of psychological stress.

4.5. Strengths and limitations

The main strength of our study is the development of a multidimensional model, which integrates the contribution of

multiple factors influencing psychological stress in children with malignant tumors, thereby providing a reference for preventing or reducing the occurrence of psychological stress. Although the model was built on plausible hypotheses based on previous studies, this study is limited by its cross-sectional rather than prospective design. Therefore, it is necessary to study the psychological stress of children with malignant tumors at different stages from a longitudinal perspective. Furthermore, this study did not include any objective index for quantitative evaluation, and physicians as well as mental health professionals should be aware of the importance to insert as much information possible in the assessment of psychological stress. Thus, we intend adding some objective indexes, such as prolactin and cortisol, to explore the causal relationship.^[38]

5. Conclusion

This study contributes to a better understanding of the determinants of psychological stress in children with malignant tumors during treatment. Social support, self-efficacy, and coping style appeared to have important direct influence on psychological stress. Self-efficacy and coping style mediated the relationship between social support and psychological stress, demonstrating that appropriate social support can enhance the level of self-efficacy and promote children to adopt positive coping styles, which is instrumental in alleviating psychological stress. These findings should be considered in the development of effective strategies for preventing psychological stress among this population.

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Author contributions

Lin Mo, Qian Liu Lu Yu, and Yang Liu conceived of and designed the study. The manuscript was drafted by Lin Mo and Qian Liu. The statistical analysis was performed by Qian Liu. The recruitment was performed by Qian Liu, Xianqian Huang, Lu Yu, and Yang Liu. The manuscript was critically reviewed by all of the authors. All of the authors read and approved the final manuscript.

Correction

When originally published, the author affiliations appeared incorrectly and have since been corrected.

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