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The influence and mechanism of recovery experience, self-disclosure and self-efficacy on negative emotion in pregnant women undergoing cesarean section with intracranial tumor

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Abstract: Background: This study aims to explore the effects of maternal recovery experience, self-disclosure, and self-efficacy on negative emotions in women with intracranial tumors undergoing cesarean section and the mechanism of their influence in order to provide a theoretical basis and practical guidance for improving maternal recovery experience and reducing negative emotions. **Methods:** A total of 118 cases of all mid- to late-stage pregnant women with combined intracranial tumors in pregnancy who underwent cesarean section at Beijing Tiantan Hospital of Capital Medical University from August 2019 to August 2024 were collected as the study subjects, and a cross-sectional survey was conducted by using the General Information Questionnaire, the Recovery Experience Questionnaire, the Depression and Anxiety Scale, the Self-disclosure Index, and the General Self-Efficacy Scale. Model 6 of Hayes' SPSS-Process program was used for the mediation effect test. **Results:** Recovery experience had a direct negative predictive effect on negative emotions ($\beta = -0.273, p < 0.001$), with a direct effect of 43.72%. Self-disclosure and self-efficacy had a partially mediated effect between recovery experience and negative emotions, with an independent mediation effect of 16.51%, 34.06%, and a chained mediation effect of 5.71%, respectively. The results of stratified linear regression showed that psychological detachment, mastery experience and control experience were influential factors of depression, and relaxation experience, mastery experience and control experience were influential factors of stress. **Conclusion:** Self-disclosure and self-efficacy have partial mediating effects between recovery experience and negative mood in patients with pregnancy-related tumors. Clinical attention should be paid to patients' negative emotions and the mediating effects of self-disclosure and self-efficacy should be assessed in order to improve patients' negative state of mind.

Keywords: self-efficacy; intracranial tumors in pregnancy; recovery experience; self-disclosure

1. Introduction

Pregnancy complicated with an intracranial tumor is a rare and serious obstetric complication during pregnancy. According to relevant reports, the incidence of pregnancy combined with intracranial tumors is comparable to the incidence of non-pregnant age-matched women [1], with an age-adjusted incidence of 5.7 per 100,000 [2]. Pregnancy itself does not increase the risk of intracranial tumors, but due to the influence of estrogen and progesterone during pregnancy, the growth rate of intracranial tumors is faster [3]. Pregnant women are prone to cerebral hernia and increased intracranial pressure, and a series of serious complications such as epilepsy. The disability rate and mortality rate are high, with a fatality rate as high as 8%–15%. Pregnant women with cancer face two major events: a life-threatening cancer

diagnosis and the pregnancy itself. For such patients, the risk of psychological comorbidities such as anxiety or depression may be higher [4,5]. Previous studies related to pregnancy complicated with intracranial tumors mainly focused on optimizing anti-cancer treatment during pregnancy and examining the effects of treatment on the fetus. However, there is limited data on the psychological effects of tumors on pregnant women, which is of great significance for improving the prognosis and quality of life of these patients.

Recovery experience refers to an individual's perception during and after restorative activities, divided into four core mental states: mental disengagement from work, relaxation, mastery, and control [6]. Relevant studies provide sufficient evidence that all four recovery experiences are negatively associated with stress-related health complaints, exhaustion, and depression, and positively associated with mental and physical health and performance [6,7]. As a positive psychological experience, recovery experience is a strategy for individuals to improve their emotional state under the influence of negative factors. Hobfoll et al. [8] show that positive resource conditions such as recovery experience and subjective well-being can make individuals gain positive perception, help individuals recover and establish a new resource system, and realize the recovery from negative emotions to work energy state. For the recovery of individual resource systems in negative emotional recovery, self-disclosure has positive significance, which is traditionally defined as a voluntary self-disclosure behavior process in which individuals tend to share personal information with others [9]. Kim et al. [10] believe that self-disclosure is an important factor in reducing pressure. Pregnant women can release stress and adjust their emotions through self-disclosure. If the negative emotions of pregnant women lack a correct release channel, efforts to hide and control their disclosure will increase internal friction, fall into self-doubt and denial, and further aggravate negative emotions. Schlosser [11] studies show that positive self-disclosure is conducive to releasing individual negative emotions, promoting physical and mental health and restoring work status. In view of the construction of individual resource system in negative emotion recovery, self-efficacy as a kind of positive psychological motivation is of great significance. Bandura describes self-efficacy as a person's belief in the ability to perform a desired function in their role [12]. High self-efficacy can continuously enhance the self-regulation ability of pregnant women so that pregnant women can correctly and positively cope with negative emotions and adverse effects and can actively adjust in the recovery of negative emotions to help the recovery process.

In conclusion, recovery experience, self-disclosure and self-efficacy are all related to negative emotional recovery and are internally related, but the mechanism of action among the four is not completely clear. Some scholars have carried out relevant studies to reveal part of the relationship. For example, Yardeni et al. [13] showed that people with a high self-disclosure tendency and a high degree of self-disclosure in the relationship between husband and wife had a higher level of personal recovery after trauma. Alice et al. [14] found that the self-efficacy of cancer patients in managing pain was significantly correlated with their ability to deal with setbacks after diagnosis and negatively correlated with the severity of pain. Improving self-efficacy was important for self-management of undertreated cancer pain and was of

great significance for improving pain outcomes and quality of life. Therefore, the purpose of this study was to investigate the current status of recovery experience in pregnant women with intracranial tumors, to further explore the mechanism of action between the four, and to provide a theoretical basis and practical guidance for improving the level of recovery experience and reducing negative emotions in similar pregnant women.

2. Materials and methods

A total of 118 cases of all mid- to late-stage pregnant women with combined intracranial tumors in pregnancy who underwent cesarean section at Beijing Tiantan Hospital of Capital Medical University from August 2019 to August 2024 were included in this study. This study was a cross-sectional survey, utilizing a combination of a WeChat web survey and an offline survey for data collection.

The inclusion criteria were as follows: (1) Age > 18 years; (2) those who were diagnosed with intracranial tumors by MRI and underwent craniotomy after cesarean section; (3) those who were diagnosed with intracranial tumors after ≥ 28 weeks of gestation; (4) expected survival time > 3 months; (5) signed informed consent; and (6) cases with complete follow-up data.

The exclusion criteria were as follows: (1) Those who were intolerant to surgery due to severe cardiorespiratory insufficiency, coagulation dysfunction (PT > 13 s) and unstable vital signs; (2) those with concurrent tumors in other sites; (3) those who developed systemic multi-organ failure; and (4) patients diagnosed with mental disorders or diagnosed with psychiatric disorders.

2.1. General information questionnaire

A general information questionnaire includes demographic data (such as age, gestational age, marital status, education level) and clinical data (such as clinical symptoms, whether a primipara, coexisting diseases, family history, smoking history, drinking history, high-fat diet, regular menstruation, anemia, postoperative pathological results, etc.).

2.2. The recovery experiences questionnaire

The Recovery Experience Questionnaire (REQ) [15] is a 16-item self-report scale designed to assess an individual's stress recovery skills in four domains: psychological detachment (4 items), relaxation (4 items), mastery (4 items), and control (4 items). The psychological detachment subscale measures how well individuals are able to stay away from or forget about work outside of their professional environment; the relaxation subscale measures how relaxed individuals are; the mastery subscale measures how open individuals are to new and challenging activities outside of work; and the control subscale measures individuals' perceptions of how much control they have over their lives and schedules. A 5-point Likert scale was used, with each entry ranging from 1 to 5 and a total score of 16 to 80, with higher scores indicating a higher level of recovery experience. The Cronbach's alpha coefficient was 0.928 in this study.

2.3. Negative emotion assessment

The Self-Rating Anxiety Scale (SAS) [16] was used to reflect the existence and degree of anxiety. It consists of 20 items, each rated from 1 to 4. The scores of each item were summed to obtain a crude score and then multiplied by 1.25 to give a standard score. The evaluation criteria are SAS score > 50, 50–59 for mild anxiety, 60–69 for moderate anxiety, and 70 and above for severe anxiety. The scale has good reliability and validity, and the Cronbach's α coefficients are above 0.721 in this study.

The Self-Rating Depression Scale (SDS) [16] was used to reflect the existence and degree of depression. It consists of 20 items. An SDS score > 52 was used as the evaluation criterion. An SDS $\geq$ 53 was classified as depression, 53–62 as mild depression, 63–72 as moderate depression, and > 72 as severe depression. The SDS has good reliability and validity, and the Cronbach's α coefficients are above 0.724 in this study.

2.4. The self-disclosure index

The Self-disclosure Index (SDI) is a brief self-report indicator that measures a person's tendency to disclose information about personal distress [17]. It has a total of 12 entries on a 5-point Likert scale, with each entry being scored from 1 to 5, where questions 2, 4, 5, 8, 9, and 10 are negative entries and reverse scored. The total score ranged from 12 to 60, with higher scores indicating greater willingness to self-expose. 12 to 29 was low, 30 to 44 was moderate, and 45 to 60 was high. The Cronbach's alpha coefficient of the scale was 0.845 in this study.

2.5. The general self-efficacy scale

The General Self-Efficacy Scale (GSEs) [18] has 10 entries. A Likert 4-point scale was used, with a total score of 10–40, with lower scores indicating lower self-efficacy. The Cronbach alpha coefficient of the scale was 0.872 in this study.

2.6. Data collection and quality control

The survey team carried out unified on-site training before the start of the survey, and the precautions and methods of operation were all explained before collection, explaining the purpose, significance and participant inclusion criteria of this study; (1) online questionnaire survey, the QR code of the questionnaire was sent to the participants through WeChat, and the participants were trained to fill out the questionnaire online; scanning the QR code to enter the platform to pop up the informed consent form to ensure that the participants were anonymous and voluntary, and fill out the questionnaire according to the unified requirements of the questionnaire; (2) offline questionnaire survey, with the assistance of a member of the team to complete the questionnaire, signing the informed consent form, and ensuring that the patients were anonymous and voluntary.

2.7. Statistical analysis

Statistical analyses were performed using SPSS 26 (IBM SPSS, USA); measurements were expressed as mean and standard deviation, and count data were

expressed as frequency and percentage. Statistical analyses between groups were performed using *t*-tests and chi-square tests; correlation analyses were performed using Pearson correlation analyses; mediation effect tests were performed using model 6 of Hayes' SPSS-Process program; and stratified linear regression analyses were performed with the four dimensions of the recovery experience, self-disclosure, and self-efficacy as the independent variables, and each of the dimensions of negative emotions as the dependent variable. *p*-values < 0.05 were considered to be statistically significant.

3. Results

3.1. A univariate analysis of patients' general data and their recovery experience

General data of the included patients were analyzed, including 92 pregnant women < 34 years old, accounting for 78%; a total of 70 patients (59.3%) were pregnant for more than 36 weeks. Among them, age, gestational age, marital status, primipara, complications with other diseases, family history, menstrual disorders, and postoperative pathological results had significant differences on the recovery experience score of pregnant women (*p* < 0.05), as shown in **Table 1**.

Table 1. Comparison of general information and recovery experience scores.

Item	Number (%)	Scores ($\bar{x} \pm s$)	t/F	p
Age				
<34	92 (78.0)	44.54 ± 10.72	6.792	0.012
≥35	26 (22.0)	40.23 ± 9.53		
Gestational weeks				
< 36	48 (40.7)	38.63 ± 12.65	5.912	0.028
≥ 36	70 (59.3)	42.75 ± 10.13		
Symptoms				
Headache and/or dizziness	109 (92.4)	41.44 ± 9.04	2.895	0.086
Nausea and/or vomiting	112 (94.9)	40.25 ± 9.37		
Tinnitus and/or hearing loss	43 (36.4)	42.78 ± 10.42		
Limb twitching and/or muscle strength loss	9 (7.6)	40.98 ± 9.71		
Other	4 (3.4)	43.63 ± 8.23		
Divorced or not				
Yes	7 (5.9)	39.70 ± 10.43	4.729	0.031
No	111 (94.1)	43.29 ± 10.64		
University degree or above				
Yes	99 (83.9)	40.45 ± 9.93	2.176	0.207
No	19 (16.1)	41.06 ± 10.42		
First-time mothers				
Yes	95 (80.5)	41.64 ± 10.72	6.394	0.018
No	23 (19.5)	45.72 ± 9.56		

Table 1. (Continued).

Item	Number (%)	Scores ($\bar{x} \pm s$)	<i>t/F</i>	<i>p</i>
With other diseases				
Yes	12 (10.2)	40.66 $\pm$ 12.67	4.157	0.041
No	106 (89.8)	43.98 $\pm$ 9.48		
Family history				
Yes	8 (6.8)	40.27 $\pm$ 11.85	7.473	0.005
No	110 (93.2)	47.78 $\pm$ 10.36		
Smoking history				
Yes	3 (2.5)	41.78 $\pm$ 10.62	−0.087	0.912
No	115 (97.5)	41.54 $\pm$ 9.61		
Drinking history				
Yes	11 (9.3)	40.92 $\pm$ 8.79	0.517	0.683
No	107 (90.7)	41.21 $\pm$ 9.13		
With high fat diet				
Yes	13 (10.0)	43.46 $\pm$ 11.73	−0.982	0.387
No	105 (90.0)	42.82 $\pm$ 10.15		
Irregular menstruation				
Yes	41 (34.7)	40.56 $\pm$ 9.97	5.298	0.038
No	77 (65.3)	44.13 $\pm$ 10.29		
Anemia				
Yes	10 (8.5)	40.89 $\pm$ 9.75	1.896	0.115
No	108 (91.5)	41.17 $\pm$ 8.67		
Pathological findings				
Benign tumor	79 (66.9)	49.23 $\pm$ 8.76	9.218	0.001
Malignant tumor	39 (33.1)	39.65 $\pm$ 12.71		

3.2. Recovery experience, negative emotion, self-disclosure, self-efficacy score

According to the comparison between the average score of the items and the median score of the scale items, the recovery experiences score of patients was 36.53 $\pm$ 8.14. The self-disclosure score was moderate; the average scores of anxiety and depression were more than 53 points; the average score of self-efficacy was 21.89 $\pm$ 5.25, as shown in **Table 2**.

3.3. Correlation analysis of recovery experience, negative emotion, self-disclosure and self-efficacy

According to the correlation analysis test, the results found that the score of patients' recovery experience was positively correlated with the scores of self-disclosure and self-efficacy but negatively correlated with the scores of negative emotions and their dimensions ($p < 0.05$), as shown in **Table 3**.

Table 2. Recovery experience, negative emotion, self-disclosure, self-efficacy score.

Item	Scoring range	Scores ($\bar{x} \pm s$)	Item's average score ($\bar{x} \pm s$)
Recovery experiences	17–61	36.53 $\pm$ 8.14	2.28 $\pm$ 0.51
Psychological detachment	4–20	10.67 $\pm$ 4.82	2.67 $\pm$ 1.21
Relaxation	4–20	8.09 $\pm$ 3.61	2.02 $\pm$ 0.90
Mastery	4–20	9.53 $\pm$ 4.92	2.38 $\pm$ 1.23
Control	4–20	8.24 $\pm$ 3.77	2.06 $\pm$ 0.94
Distress disclosure	13–51	33.26 $\pm$ 9.05	2.77 $\pm$ 0.75
Negative emotion	81–148	109.55 $\pm$ 20.71	2.74 $\pm$ 0.52
Anxiety	42–71	53.78 $\pm$ 11.29	2.69 $\pm$ 0.56
Depression	40–79	55.26 $\pm$ 12.43	2.76 $\pm$ 0.62
General self-efficacy	11–31	21.89 $\pm$ 5.25	2.19 $\pm$ 0.53

Table 3. Correlation analysis of recovery experience, negative emotion, self-disclosure and self-efficacy (r).

Item	Recovery experiences	Psychological detachment	Relaxation	Mastery	Control	Self-disclosure	Negative emotion	Anxiety	Depression	General self-efficacy
Recovery experiences	1.000	-	-	-	-	-	-	-	-	-
Psychological detachment	0.641 ^a	1.000	-	-	-	-	-	-	-	-
Relaxation	0.573 ^a	0.121 ^a	1.000	-	-	-	-	-	-	-
Mastery	0.602 ^a	0.156	0.143	1.000	-	-	-	-	-	-
Control	0.597 ^a	0.151 ^a	0.165 ^a	0.155	1.000	-	-	-	-	-
Self-disclosure	0.452 ^a	0.239 ^a	0.161 ^a	0.339 ^a	0.382 ^a	1.000	-	-	-	-
Negative emotion	-0.518 ^a	-0.266 ^b	-0.250 ^a	-0.217 ^a	-0.492 ^a	-0.434 ^b	1.000	-	-	-
Anxiety	-0.437 ^b	-0.128 ^a	-0.232 ^a	-0.239 ^a	-0.423 ^a	-0.367 ^b	0.813 ^a	1.000	-	-
Depression	-0.433 ^a	-0.237 ^a	-0.118 ^a	-0.251 ^a	-0.441 ^a	-0.392 ^a	0.806 ^a	0.468 ^a	1.000	-
General Self-Efficacy	0.567 ^a	0.263 ^a	0.347 ^a	0.178 ^a	0.603 ^a	0.431 ^a	-0.544 ^a	-0.432 ^a	-0.419 ^a	1.000

Note: a: $p < 0.01$; b: $p < 0.05$; - : Blank item.

3.4. Regression analysis of intermediary model

Multiple mediating effects of patients' self-disclosure and self-efficacy on recovery experience and negative emotions were analyzed. The results of regression analysis showed that recovery experience had a direct positive predictive effect on self-disclosure and self-efficacy ($\beta = 0.467, 0.209, p < 0.001$). Recovery experience had a direct negative predictive effect on negative emotion ($\beta = -0.273, p < 0.001$). Self-disclosure and self-efficacy had a direct negative predictive effect on negative emotion ($\beta = -0.230, -0.851, p < 0.001$). Self-disclosure had a direct positive predictive effect on self-efficacy ($\beta = 0.123, p < 0.001$), as shown in **Table 4**.

Table 4. Regression analysis of recovery experience, pain disclosure, self-efficacy and negative emotion in the mediation model.

Item	Predictor	β	Standard error	<i>t</i>	<i>p</i>	95% CI
Self-disclosure	Recovery experiences	0.467	0.089	6.12	< 0.001	0.301~0.538
General self-efficacy	Recovery experiences	0.209	0.021	8.53	< 0.001	0.158~0.287
	Self-disclosure	0.123	0.031	4.19	< 0.001	0.063~0.198
Negative emotion	Recovery experiences	-0.273	0.088	-3.65	< 0.001	-0.427~-0.116
	Self-disclosure	-0.238	0.074	-3.27	< 0.001	-0.336~-0.075
	General self-efficacy	-0.851	0.164	-5.73	< 0.001	-1.142~-0.601

3.5. Significance test of mediating effect

The bootstrap analysis method was used to test the significance of the mediating effect. According to the 95% CI results of the direct effect of recovery experience on negative emotions and the mediating effect of self-disclosure and self-efficacy, it was indicated that there was a partial mediating effect between recovery experience and negative emotions, and the direct effect was 43.72%. The independent mediating effect of self-disclosure and self-efficacy was 16.51% and 34.06% respectively, and the chain mediating effect of the two was 5.71%, as shown in **Table 5**.

Table 5. Test of the direct and mediating effects of recovery experience on negative emotions.

Item	Path	β	Standard error	95% CI	Relative effect size (%)
Direct effect	Recovery experiences→Negative emotion	-0.312	0.088	-0.421~-0.103	43.72
Indirect effect 1	Recovery experience→Self-disclosure→Negative emotion	-0.078	0.042	-0.159~-0.028	16.51
Indirect effect 2	Recovery experiences→Self-disclosure→General self-efficacy→Negative emotion	-0.027	0.014	-0.055~-0.009	5.71
Indirect effect 3	Recovery experiences→General self-efficacy→Negative emotion	-0.181	0.045	-0.328~-0.142	34.06
Total effect	-	-0.592	0.079	-0.721~-0.437	100

Note: - : Blank item.

3.6. Hierarchical linear regression analysis of recovery experience, self-disclosure and self-efficacy on each dimension of negative emotions

The results of hierarchical linear regression analysis showed that psychological disengagement, mastery experience and control experience were the influencing factors of depression ($p < 0.05$); relaxation experience, mastery experience and control experience were the influencing factors of stress ($p < 0.05$), as shown in **Table 6**.

Table 6. Hierarchical linear regression analysis of each dimension of negative emotion.

Outcome variables	Predictor variables	β	t	p
Depression	Psychological detachment	−0.148	−2.631	0.009
	Mastery	−0.117	−2.236	0.021
	Control	−0.269	−3.825	< 0.001
	Self-disclosure	−0.137	−2.562	0.013
	General self-efficacy	−0.194	−2.974	0.005
Anxiety	Relaxation	−0.133	−2.313	0.015
	Mastery	−0.109	−2.064	0.038
	Control	−0.231	−3.415	0.001
	Self-disclosure	−0.156	−2.678	0.027
	General self-efficacy	−0.286	−4.182	< 0.001

4. Discussion

Combined intracranial tumors in pregnancy are still a great challenge in clinical treatment. Due to the difficulty of early clinical diagnosis and the time-consuming process of definitive diagnosis, it is extremely harmful to both mother and fetus [19]. However, in addition to this diagnosis and treatment, the psychological condition of patients also needs to be emphasized. It has been found that anxiety and depression are the most common disease diagnoses in patients with comorbidities in pregnancy [20], and emphasizing the psychological health of patients has a significant effect on improving their quality of life [21]. The concept of “recovery experience” was first proposed by Sonnentag and Ritz [22], and it is considered that the recovery experience is a process of potential psychological recovery that an individual achieves by adopting different ways of recovery. In this study, patients with advanced age, small gestational weeks, divorced status, primigravida, comorbidities with other diseases, family history, previous menstrual disorders, and postoperative pathologic findings returned as malignant had a lower recovery experience score. The study concluded that for the above factors which are objective or long-standing realities, patients are less psychologically resilient and less able to accept the results of their treatment in the face of the present, and therefore have relatively lower recovery experience scores. In this study, we believe that patients need to face the pressure in this difficult situation, which leads to negative emotions such as anxiety and depression. The recovery experience can significantly affect the psychological distress of patients, and there is a close relationship between the two. Previous studies have found that negative emotions during pregnancy are influenced by a variety of factors, such as maternal age, social support, and comorbidities [23,24]. Similar to the results of the present study, the patients’ SAS and SDS scores were greater than 53, which also confirms the presence of negative emotions and the significant correlation between the recovery experience and them. The study by Evaldas et al. [25] also showed a significant correlation between the REQ levels and the anxiety, depression, and sense of well-being. In addition, according to the results of this study, all dimensions of the recovery experience were significantly correlated with negative emotions. For example,

psychological detachment often means not being occupied with the present dilemma, such as no longer listening to presentations about the condition and its progress. We believe that this psychological change implies that the patient stops thinking about disease-related issues for a while, and that psychological escape is more important than physical. Lucille et al. [26] showed that psychological detachment reduces negative emotions, and that relaxation experience predicts positive emotions, such as seeing the child as a belief or thinking about a good life experience in the future, which can be shifted to a positive state of mind. The recovery process can be viewed as an emotional journey in which the individual's shift from negative to positive affect is an important aspect. Emotion regulation is a key factor affecting recovery experience and well-being. This conclusion is well explained by the fact that effective emotion regulation strategies can help individuals better deal with stress and negative emotions, thereby facilitating the recovery process. The results of this study suggest that mastery experience and control experience can alleviate stress symptoms and extreme negative emotions of anxiety and depression. Mastery experience [27] and control experience [28] are a kind of psychological capital to help realize self-worth, similar to the role of "motivational factors" in the two-factor theory, which can stimulate positive emotions, promote the integration and reconstruction of psychological resources, and promote the recovery of the deep-rooted negative state of anxiety and depression.

On the other hand, self-disclosure in the present study exerted a mediating effect between recovery experience and negative emotions. The findings suggest that recovery experience positively predicts self-expression. Self-expression therapy helps to restore the normal energy state of patients by encouraging them to express more of their inner thoughts, which can stop depleting psychological resources and change the perspective of looking at problems by venting negative emotions [29,30]. As a positive psychological response, recovery experience restores, replenishes and reconstructs psychological resources, which can enhance patients' psychological self-confidence and play an effective role in supporting and promoting patients' self-expression behavior. Especially for tumor patients, self-expression can be used as a nursing intervention to reduce the negative impact of tumors [31]. It is consistent with the conclusion that self-expression negatively predicts negative emotions in this study. That is, the mediating effect of self-expression should be fully utilized to enhance the positive effect of recovery experience on negative affect. In addition, self-efficacy also plays a mediating effect between the two. The present study also showed that distress representation positively predicted self-efficacy. As self-efficacy enhances the supplementation and deployment of patients' psychological resources, and individuals with higher self-efficacy may be better able to deal with negative perceptions related to trauma and thus reduce psychological stress after trauma, while individuals with high self-efficacy may be more confident and able to effectively apply coping strategies to mitigate the impact of negative emotions, thus the two play a chain mediating effect between the recovery experience and negative emotions.

In summary, we can see that in clinical practice, we should pay attention to pregnant women's pain expression and self-efficacy [32], and take corresponding measures, such as providing patients with opportunities for self-expression and psychological guidance in treatment. The chain mediation effect indicates that the recovery experience has a direct effect on negative emotions and the multiple

mediating effects of pain expression and self-efficacy in the recovery process of negative emotions dominated by the recovery experience. This study provides a new focus for clinicians facing the care of patients with intracranial tumors in pregnancy. However, there are still shortcomings in this study, such as the limited number of samples, which cannot fully represent the whole population, and the single center, which cannot fully reflect the situation in other regions. Future multi-center and longitudinal studies are recommended to make the findings more broadly applicable. In addition, the 5-year time span may have led to changes in some variables (e.g., maternal mood and health status) that are not directly captured by cross-sectional data, thus limiting the generalizability of the conclusions in practice, and they need to be interpreted with caution.

5. Conclusion

For patients with pregnancy complicated with tumor, recovery experience is a positive psychological factor affecting negative emotions, and self-disclosure and self-efficacy are important psychological mechanisms between them. Clinical attention should be paid to patients' negative emotions, the mediating effects of self-disclosure and self-efficacy should be evaluated, and corresponding measures should be taken to improve patients' negative emotions.

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Ethical approval: The procedures for both T1 and T2 surveys adhered to the (i) Declaration of Helsinki, and (ii) ethical principles for medical, psychological, and sociological research involving human participants. The Ethics Committee of Beijing Tian Tan Hospital (Ethical approval number: KY2025-035) Capital Medical University has approved this research protocol. All participants signed the informed consent in this study.

Conflict of interest: The authors declare no conflict of interest.

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